

**DEVELOPMENT AND EVALUATION OF  
EFFECTS OF A PRIMARY HEALTH CARE-  
BASED PHYSIOTHERAPY PROTOCOL ON  
SELECTED INDICES OF STROKE RECOVERY**

BY

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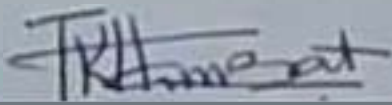
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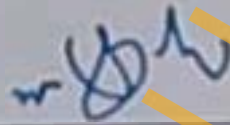
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## CERTIFICATION

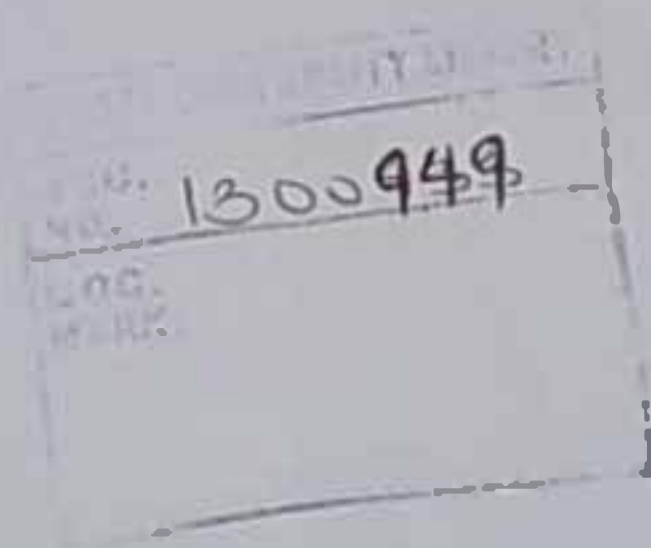
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## DEDICATION

This thesis is dedicated to my three 'Muskeeteers':

*Olatunde, Temiloluwa and Anjolaoluwa*

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## DEDICATION

This thesis is dedicated to my three 'Musketees':

*Olatunde, Temiloluwa and Anjolaoluwa*

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## ABSTRACT

Stroke rehabilitation is traditionally carried out in various hospital and rehabilitation settings. Evidence is accruing that post-stroke patients can also benefit from treatments based in the community or at primary health care centres. There is however a dearth of Primary Health Care-Based Physiotherapy Protocol (PHCBP) for enhancing recovery post-stroke. This study was designed to develop, and evaluate the effects of a PHCBP on selected indices of stroke recovery.

The physiotherapy evidence database was used to identify treatment approaches and modalities with proven efficacy. These established treatment approaches were synthesised to develop the PHCBP. The PHCBP was then used in a quasi-experimental research involving 56 consenting individuals with first incident stroke, consecutively recruited and randomly assigned into either the Primary Health Care Group (PHCG, n=29) or the Home Group (HG, n=27). Fifty-two individuals comprising 25 PHCG and 27 HG participants completed the study. Participants in the PHCG and HG were treated at a primary health centre and their homes respectively, twice weekly for 10 consecutive weeks using PHCBP. Motor function ability, postural balance and community reintegration were assessed using the Modified Motor Assessment Scale (MMAS, obtainable score 0 to 48), Short Form of Postural Assessment Scale for Stroke (SFPASS, obtainable score 0 to 15) and Reintegration to Normal Living Index (RNLI, obtainable score 0 to 100%) respectively, before intervention and thereafter fortnightly. Walking Speed and quality of life were assessed using a stopwatch and Health Related Quality of Life in Stroke Patients (HRQLISP, obtainable score 0 to 100%) respectively, before and at week 10 of intervention. Data were analysed using descriptive statistics, t-test and general linear model for repeated measures at  $p = 0.05$ .

The PHCG (60.6±10.2 years) and HG (61.7±8.4 years) were comparable in age. Within-subjects multivariate analysis, after controlling for gender, showed a significant increase in the MMAS scores for the PHCG (22.9±15.2) and HG (19.9±16.4) at pre-intervention to 34.7±11.7 and 36.6±10.3 respectively at week 10. There was a significant increase in SFPASS scores of the PHCG (8.6±5.0) and HG (7.1±5.6) at pre-intervention to 12.3±3.2 and 12.3±3.3 at week 10 respectively. The HRQLISP scores significantly increased from 70.4±4.9 pre-intervention to 75.2±5.4 in the PHCG and from 60.7±5.8 to 74.8±5.9 in the

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Stroke rehabilitation is traditionally carried out in various hospital and rehabilitation settings. Evidence is accruing that post-stroke patients can also benefit from treatments based in the community or at primary health care centres. There is however a dearth of Primary Health Care-Based Physiotherapy Protocol (PHICPP) for enhancing recovery post-stroke. This study was designed to develop, and evaluate the effects of a PHICPP on selected indices of stroke recovery.

The physiotherapy evidence database was used to identify treatment approaches and modalities with proven efficacy. These established treatment approaches were synthesised to develop the PHICPP. The PHICPP was then used in a quasi-experimental research involving 56 consenting individuals with first incident stroke, consecutively recruited and randomly assigned into either the Primary Health Care Group (PHCG, n=29) or the Home Group (HG, n=27). Fifty-two individuals comprising 25 PHCG and 27 HG participants completed the study. Participants in the PHCG and HG were treated at a primary health centre and their homes respectively, twice weekly for 10 consecutive weeks using PHICPP. Motor function ability, postural balance and community reintegration were assessed using the Modified Motor Assessment Scale (MMAS, obtainable score 0 to 18), Short Form of Postural Assessment Scale for Stroke (SFPASS, obtainable score 0 to 15) and Reintegration to Normal Living Index (RNLI, obtainable score 0 to 100%) respectively, before intervention and thereafter fortnightly. Walking Speed and quality of life were assessed using a stopwatch and Health Related Quality of Life in Stroke Patients (HRQLISP, obtainable score 0 to 100%) respectively, before and at week 10 of intervention. Data were analysed using descriptive statistics, t-test and general linear model for repeated measures at  $p = 0.05$ .

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IG. Similarly, walking speed significantly increased from  $0.30 \pm 0.20$  m/s pre-intervention to  $0.60 \pm 0.40$  m/s at week 10 in the PICG and from  $0.30 \pm 0.40$  m/s to  $0.50 \pm 0.40$  m/s in the HG. The groups were comparable in each of the MMAS, RNL, SFPASS, walking speed and overall HRQLSP scores pre-intervention and at week 10. However, the PICG had a significantly higher spiritual interaction score ( $77.6 \pm 9.3$ ) on the HRQLSP measure than the HG ( $74.2 \pm 8.3$ ).

The primary health care-based physiotherapy protocol improved motor function ability, walking speed, postural balance and quality of life among post-stroke patients. This protocol can be used for stroke rehabilitation at home and primary health centres which are closer to the community.

**Keywords:** Stroke rehabilitation; Primary health care; Physiotherapy protocol

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## TABLE OF CONTENTS

TITLE	PAGE
Title page .....	i
Certification .....	ii
Dedication .....	iii
Abstract .....	iv
Acknowledgement .....	vi
Table of Contents .....	vii
List of Tables .....	x
List of Figures .....	xii
List of Plates .....	xiii
<b>CHAPTER ONE: INTRODUCTION</b> .....	<b>1</b>
1.9 Introduction .....	1
1.10 Statement of Problem .....	1
1.11 Aims of Study .....	5
1.12 Hypotheses .....	5
1.12.1 Major Hypotheses .....	5
1.12.2 Sub-Hypotheses .....	6
1.13 Delimitations .....	8
1.14 Limitations .....	8
1.15 Significance of the Study .....	9
1.16 Definition of Operational Terms .....	9
<b>CHAPTER TWO: LITERATURE REVIEW</b> .....	<b>10</b>
2.1 Stroke .....	10
2.1.1 Definitions .....	10
2.1.2 Epidemiology of Stroke .....	11
2.1.3 The Burden of Stroke .....	12
2.2 Rehabilitation after Stroke .....	13
2.2.1 Measures of Functional Recovery after Stroke .....	15
2.3 Stroke Rehabilitation in the Community .....	17
2.3.1 Home – Based Rehabilitation .....	18
2.3.2 Primary Health Care .....	19
2.4 Community Reintegration after Stroke .....	21

2.4.1	Factors Influencing Community Reintegration.....	22
2.4.2	Measures of Community Reintegration.....	23
<b>CHAPTER THREE: MATERIALS AND METHODS.....</b>		<b>25</b>
3.1	Participants.....	25
3.2	Materials.....	26
3.3	Methods.....	28
3.3.1	Research Design.....	28
3.3.2	Sampling Technique.....	28
3.3.3	Sample Size Determination.....	28
3.3.4	Procedure.....	28
3.4	Data Analyses.....	37
<b>CHAPTER FOUR: RESULTS AND DISCUSSION.....</b>		<b>38</b>
4.1	Results.....	38
4.1.1	Development of the Primary Health Care-based Physiotherapy Protocol.....	38
4.1.2	Demographic and Clinical Characteristics of Study the Participants.....	38
4.1.3	Changes in Motor Function Scores (MMAS) of Participants over 10 weeks.....	39
4.1.4	Changes in Postural Balance Scores (SF-PASS) of Participants over 10 weeks.....	44
4.1.5	Changes in Community Reintegration Scores (RNL) of Participants over 10 weeks.....	44
4.1.6	Changes in Quality of Life (HRQLISP) Scores over 10 weeks.....	55
4.1.7	Changes in Asymmetry Ratio and Walking Speed over 10 weeks ..	55
4.2	Hypotheses Testing.....	62
4.3	Discussion.....	67
4.3.1	Development of the Primary Health Care-based Physiotherapy Protocol.....	67
4.3.2	Demographic and Clinical Characteristics of Study Participants.....	67
4.3.3	Changes in Motor Function Scores (MMAS) of Participants over 10 weeks.....	68
4.3.4	Changes in Postural Balance Scores (SF-PASS) of	

Participants over 10 weeks.....	69
4.3.5 Changes in Community Reintegration Scores (RNLI) of Participants over 10 weeks.....	69
4.3.6 Changes in Quality of Life (HRQLISF) Scores over 10 weeks.....	70
4.3.7 Changes in Asymmetry Ratio and Walking Speed over 10 weeks ..	71
<b>CHAPTER FIVE:</b>	
<b>SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>72</b>
5.1 Summary .....	72
5.2 Conclusions.....	73
5.3 Recommendations.....	74
<b>REFERENCES.....</b>	<b>75</b>
<b>APPENDICES.....</b>	<b>86</b>
Appendix A – Stroke Levity Scale.....	86
Appendix B – Modified Motor Assessment Scale.....	87
Appendix C – Short Form Postural Assessment Scale for Stroke.....	92
Appendix D – Reintegration to Normal Living Index.....	93
Appendix E – Health Related Quality of Life in Stroke Patients.....	94
Appendix F - Ethical Approval.....	112
Appendix G – Permission from PHC Authority.....	113
Appendix H – The Primary Health Care-based Physiotherapy Protocol ..	114

## LIST OF TABLES

<b>Table</b>		<b>Page</b>
4.1	Demographic and Clinical Characteristics of Participants .....	40
4.2	Comparison of motor function scores of participants in the Primary Health Care group from baseline to week 10.....	42
4.3	Comparison of motor function scores of participants in the Home group from baseline to week 10.....	43
4.4	Comparison of motor function scores of participants in the Primary Health Care and Home groups from baseline to week 10.....	46
4.5	Comparison of postural balance scores of participants in the Primary Health Care group from baseline to week 10.....	47
4.6	Comparison of postural balance scores of participants in the Home group from baseline to week 10.....	48
4.7	Comparison of postural balance scores of participants in the Primary Health Care and Home groups from baseline to week 10 .....	50
4.8	Comparison of community reintegration scores of participants in the Primary Health Care group from baseline to week 10 .....	51
4.9	Comparison of community reintegration scores of participants in the Home group from baseline to week 10 .....	52
4.10	Comparison of community reintegration scores of participants in the Primary Health Care and Home groups from baseline to week 10.....	54
4.11	Comparison of quality of life scores of participants in the Primary Health Care group at baseline and week 10 .....	56
4.12	Comparison of quality of life scores of participants in the Home group at baseline and week 10 .....	57
4.13	Comparison of quality of life scores of participants in the Primary Health Care and Home groups at baseline .....	58
4.14	Comparison of quality of life scores of participants in the Primary Health Care and Home groups at week 10 .....	59
4.15	Within-group comparison of asymmetry ratio and walking speed of participants in the Primary Health Care and Home groups at baseline .....	60

4.16 Between-group comparison of asymmetry ratio and walking speed of participants in the Primary Health Care and Home groups at baseline and week 10.....61

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## LIST OF FIGURES

Figure	Page
4.1	Distribution of participants in the Primary Health Care and Home groups by past medical history .....41
4.2	Trend of motor function scores in the Primary Health Care and Home groups.....45
4.3	Trend of postural balance scores in the Primary Health Care and Home groups.....49
4.4	Trend of community reintegration scores in the Primary Health Care and Home groups.....53

## LIST PLATES

Plates	Page
3.1. Participant standing on two weighing scales to determine weight distribution while Blinded Observer took readings.....	31
3.2. Participants performing the 10-metre walk while the Blinded Observer timed the central 6-metre walk.....	32
3.3. Hand function board used for training bimanual activities.....	36

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Introduction

Stroke is an acute disturbance of focal or global cerebral function with symptoms lasting more than 24 hours or resulting in death with no apparent cause other than vascular origin (WHO MONICA, 1988). The 24-hour limit divides stroke from transient ischemic attack, which is a related syndrome of stroke symptoms that resolve completely within 24 hours (Donnan et al, 2008). The new paradigm shift in stroke definition, however, utilises a tissue criterion rather than time criterion. Stroke is the commonest neurological disorder worldwide, the second commonest medical condition in the developed world and the leading cause of disability among adults (Goldbeck, 2001; Lopez and Mathers, 2006). Komolafe et al (2006) also described it as one of the world's major causes of morbidity and mortality. Talabi (2003) observed that stroke was the most common cause of adult neurologic admission on medical wards of the University College Hospital (UCH), Ibadan. It also accounted for 57.1% of all new referrals to the medicine and neurology unit of the Physiotherapy Department of the UCH, Ibadan between January, 2006 and December, 2010 (Olaleye, 2011).

The incidence of stroke increases with age and is likely to increase with the aging world populations (Russo et al, 2011). This is in addition to the fact that more people survive stroke now because of improvements in healthcare. However, many have to cope with the physical, psychological, social and functional sequelae resulting in increased personal and public costs (Mayo et al, 1999; Winstein et al, 2003; Kollen et al, 2006). The resultant high economic costs have made the reduction of stroke-related disability a priority (Winstein et al, 2003) and rehabilitation offers the opportunity for such reduction (Teasell et al, 2004). Evidence has shown that rehabilitation can make



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### INTRODUCTION

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a difference in stroke survivors by improving neurological recovery and enhancing performance of activities of daily living beyond what occurs spontaneously (Hsieh et al, 2002). Stroke rehabilitation starts in the hospital but continues after the individual has returned to the community (Young and Forster, 2007). However, limited information exists on the best way to organise stroke rehabilitation after hospital discharge and the relative cost of such services (Anderson et al, 2002).

Several options exist for specialised stroke care and these include outpatient services, day hospital programmes, home-based rehabilitation services or other alternative services (Canadian Stroke Strategy, 2006). These services are incidentally available in Nigeria. Institution-based rehabilitation and outpatient services are models recognizable to most healthcare professionals and such models are in most countries urban-based, relatively inaccessible or expensive to access (World Confederation for Physical Therapy - WCPT, 2003). Introducing rehabilitation services at a local or community level removes, or reduces to the minimum, the many obstacles that are associated with traditional institutional care such as difficulty of travel and its expenses, removes barriers that limit resumption of past activities and improve quality of life (Stanton 2000; Boyce et al, 2002). With the global emphasis on Primary Health Care (PHC), it is conceivable that the rehabilitation of people with stroke will become progressively more community-based (Hale, 2004).

Community-Based Rehabilitation (CBR) may be defined as care received in the community once the patients have passed the acute stage and have transitioned back to their homes or community environment (Canadian Stroke Strategy, 2006). CBR is a response in both developed and developing countries to the need for adequate and appropriate rehabilitation services to be made available to a greater proportion of the population with disabilities (Boyce et al, 2002) and was introduced as a strategy to provide 'Health for All'. Community-based rehabilitation is different from home-based rehabilitation. Literally, CBR means basic rehabilitation services provided at community level while home or domiciliary care means services delivered in the home (Hale, 2004).

Evidence on the effectiveness of Home-Based Rehabilitation (HBR) after hospital discharge are available from several randomised control trials comparing HBR with outpatient institutional care for stroke in the United Kingdom (Gladman and Lincoln, 1994; Roderick et al, 2001), New Zealand (Baskett et al, 1999) and in the USA (Sargent and Patterson, 1993). HBR has the potential advantages of greater involvement of the informal caregiver, rehabilitation in the place where the patient spends most of his time and avoidance of patient travel (Roderick et al, 2001). The patient is seen in his/her own surrounding where it may be easy to identify real, practical problems and find solutions to them than in the alien environment of a hospital (Gladman et al, 1993). Studies comparing institutional rehabilitation with home-based interventions generally indicated more positive benefits among the home-based groups in terms of functional outcomes and societal participation (Monger et al, 2002; Leroux, 2005). However, it may result in isolation of the stroke survivor as well as loss or invasion of patient's privacy by the healthcare provider (Hale, 2004).

Primary Health Care (PHC) reforms have and continue to develop in many countries (Soever, 2006). PHC models are seen as effective strategies to improve access of clients to needed care, improve efficiency, coordination, continuity of care and to ensure health needs are met in the right place, at the right time by the most appropriate health care providers (Soever, 2006). The study of Dobrzanska et al (2006) has shown that patients who have had a stroke can be successfully rehabilitated in a community hospital. Community hospitals (known as Primary Health Centres in Nigeria) are defined as small hospitals with few on-site diagnostic facilities or specialized services and are long established components of healthcare provisions (Young and Donaldson, 2001). Community-based exercise programmes have been found to improve and retain mobility, functional capacity and balance and result in a demonstrable impact upon the performance of activities and abilities that are considered meaningful to stroke subjects (Mayo et al, 2000, Eng et al, 2003; Hare et al, 2006).

This global paradigm shift in healthcare delivery to primary health care-based models is also being emphasized in Nigeria. According to the Nigerian government, PHC is

the way to go if Nigeria hopes to provide affordable and sustainable care for its citizenry. For this to be completed there is a need to have primary health care models for constituent health professions - one of which is physiotherapy. Currently, in Nigeria, there is a general reliance on hospital for rehabilitation of patients with stroke. Hence, the need for a Primary Health Care-Based Physiotherapy service in Nigeria.

## 1.2 Statement of Problems

The increasing cost of hospital-based rehabilitation is enhancing the attractiveness of Home-Based Rehabilitation (HBR). However, the exact timing and content of home-based therapies for optimal outcome is unclear. A resolution stating that Primary Health Care (PHC) was the key to attaining an acceptable level of health for all was approved by the 32nd World Health Assembly in Geneva (1978). With this global emphasis on PHC, the rehabilitation of people with stroke is becoming more community-based (Hale, 2004). Yet, community-based rehabilitation of stroke survivors is still facing implementation challenges in Nigeria in spite of evidence showing that rehabilitation services in patients' home and community environment help remove barriers that usually limit resumption of participation and improve quality of life. International models have also demonstrated the feasibility and cost - saving role of physiotherapy in primary care as a means of providing the public with easy access to physiotherapy (Fricke, 2005). The challenges may not be unconnected with unavailability or dearth of 'appropriate technology' and indigenous evidence on the feasibility of using Primary Health Centres for stroke rehabilitation. This study therefore developed a Primary Health Care-based Physiotherapy Protocol that requires simple, easy-to-use equipment and investigate its effects on selected clinical indices of stroke recovery.

The questions then were:

1. Would the developed Primary Health Care-based Physiotherapy Protocol (PHCPP) be an effective treatment protocol for effecting changes in selected clinical indices of stroke recovery (motor function ability, postural balance, community reintegration, quality of life, asymmetry ratio and walking speed) among chronic stroke survivors over a 10-week period?

2. What would be the comparative effects of the PHICPP on the selected clinical indices of stroke recovery among chronic stroke survivors treated at a primary health centre and their counterparts treated at their respective homes over a 10-week period?

### 1.3 Aims of Study

The aims of this study were to:

1. Develop a Primary Health Care-based Physiotherapy Protocol (PHICPP) that requires simple, easy-to-use equipment for stroke rehabilitation.
2. Investigate the effects of the PHICPP on selected clinical indices of stroke recovery (motor function ability, postural balance, community reintegration, quality of life, asymmetry ratio and walking speed) among chronic stroke survivors over a 10-week period.
3. Evaluate the comparative effects of the PHICPP on selected clinical indices of stroke recovery (motor function ability, postural balance, community reintegration, quality of life, asymmetry ratio and walking speed) among chronic stroke survivors treated at a primary health centre and their counterparts treated at their respective homes over a 10-week period.

### 1.4 Hypotheses

#### 1.4.1 Major Hypotheses

1. A Primary Health Care Physiotherapy Protocol would not be an effective treatment protocol for effecting significant changes in clinical indices of stroke recovery among chronic stroke survivors over a 10-week period.
2. There would be no significant difference in the motor function ability, postural balance, community reintegration, quality of life, asymmetry ratio and walking speed of chronic stroke survivors treated at a primary health centre and their counterparts treated at their respective homes using a Primary Health Care-based Physiotherapy Protocol over a 10-week period.

### 1.4.2 Sub-hypotheses

1. There would be no significant difference in the pre- and post-10 weeks motor function ability scores of chronic stroke survivors treated at a primary health centre using the PHCPP.
2. There would be no significant difference in the pre- and post-10 weeks postural balance scores of chronic stroke survivors treated at a primary health centre using the PHCPP.
3. There would be no significant difference in the pre- and post-10 weeks community reintegration scores of chronic stroke survivors treated at a primary health centre using the PHCPP.
4. There would be no significant difference in the pre- and post-10 weeks quality of life scores on the HRQLISP measure of chronic stroke survivors treated at a primary health centre using the PHCPP.
5. There would be no significant difference in the pre- and post-10 weeks asymmetry ratio of chronic stroke survivors treated at a primary health centre using the PHCPP.
6. There would be no significant difference in the pre- and post-10 weeks walking speed of chronic stroke survivors treated at a primary health centre using the PHCPP.
7. There would be no significant difference in the pre- and post-10 weeks motor function ability scores of chronic stroke survivors treated at their respective homes using the PHCPP.
8. There would be no significant difference in the pre- and post-10 weeks postural balance scores of chronic stroke survivors treated at their respective homes using the PHCPP.
9. There would be no significant difference in the pre- and post-10 weeks community reintegration scores of chronic stroke survivors treated at their respective homes using the PHCPP.
10. There would be no significant difference in the pre- and post-10 weeks quality of life scores on the HRQLISP measure of chronic stroke survivors treated at their respective homes using the PHCPP.

11. There would be no significant difference in the pre- and post-10 weeks asymmetry ratio of chronic stroke survivors treated at their respective homes using the PHCPP.
12. There would be no significant difference in the pre- and post-10 weeks walking speed of chronic stroke survivors treated at a primary health centre using the PHCPP.
13. There would be no significant difference between the pre- and post-10 weeks motor function ability scores of chronic stroke survivors treated at a primary health centre and counterparts treated in their respective homes using the PHCPP.
14. There would be no significant difference between the pre- and post-10 weeks postural balance scores of chronic stroke survivors treated at a primary health centre and their counterparts treated in their respective homes using the PHCPP.
15. There would be no significant difference between the pre- and post-10 weeks community reintegration scores of chronic stroke survivors treated at a primary health centre and their counterparts treated in their respective homes using the PHCPP.
16. There would be no significant difference between the pre- and post-10 weeks quality of life scores on the HRQLISP measure of chronic stroke survivors treated at a primary health centre and their counterparts treated in their respective homes using the PHCPP.
17. There would be no significant difference between the pre- and post-10 weeks asymmetry ratio of chronic stroke survivors treated at a primary health centre and their counterparts treated in their respective homes using the PHCPP.
18. There would be no significant difference between the pre- and post-10 weeks walking speed of chronic stroke survivors treated at a primary health centre and their counterparts treated in their respective homes using the PHCPP.

## 1.5 Delimitation

This study was delimited to the following:

- a. Subjects: (a) Consenting individuals with a first incidence stroke who were recruited at the point of discharge to their respective homes in Ibadan from the in-patient facilities or on first visit to the physiotherapy clinics of the University College Hospital (UCH) and Adeoyo Maternity Teaching Hospital, Ibadan  
(b) Stroke survivors who were not aphasic and who could comprehend and follow a 3-step command (minimal or no cognitive impairment).  
(c) Stroke survivors with a maximum score of 2 on the Modified Ashworth Scale of spasticity.
- b. Instruments: The use of the Stroke Levity Scale (Owolabi and Platz, 2008); Modified Motor Assessment Scale (Carr et al, 1985); Postural Assessment Scale for Stroke –Short Form (Chien et al, 2007); Reintegration to Normal Living Index (Wood-Dauphinee et al, 1988); Health Related Quality of Life in Stroke Patients (Owolabi and Ogunniyi, 2009) to measure severity of stroke, motor function ability, postural balance, community reintegration and health related quality of life respectively.
- c. Venue: The study was carried out at the Primary Health Centre, Oniyangin, Ibadan and individual patients' homes.
- d. Duration: The study period was delimited to 10 weeks.

## 1.6 Limitations

The following limitations were encountered during this study:

1. Standardization of care was not totally applicable to all participants as progression of PII CPP was based on individual participant's performance and tolerance.
2. It was also possible that some of the patients could have received other forms of orthodox or unorthodox treatment for their stroke. These could have had some impact on the outcomes.



## 1.7 Significance of the Study

Rehabilitation of stroke survivors still poses a great challenge to patients as well as their informal and formal carers. This is because rehabilitation is often expensive, not easily accessible and is largely equipment-based. There is an increasing Physiotherapist-to-Patient disproportion in the tertiary physiotherapy clinics where most patients go to for rehabilitation in Nigeria. There is also an associated increase in patients' waiting time. This study has developed a primary health care-based physiotherapy protocol that improved motor function ability, postural balance, community reintegration, health-related quality of life and walking speed among post-stroke patients.

- i) This protocol can be used for stroke rehabilitation at home and primary health centres which are closer to the community to improve the motor function ability, postural balance, health-related quality of life and walking speed of chronic stroke survivors.
- ii) The outcome of this study has provided scientific evidence to support the possible use of primary health centres for stroke rehabilitation. This will bring rehabilitation services closer to where patients live, thereby removing the stress and cost of travelling and reducing patients' waiting time.

## 1.8 Definition of Operational Terms

**Chronic Stroke Survivors:** These are individuals with first incidence stroke who had not stayed longer than 2 weeks at home post discharge from hospital at the point of recruitment into the study.

**Informal Carers:** These are patient's relations or significant others who are involved in the care of the stroke survivors particularly at home.

**Formal Carers:** These are health care practitioners such as physiotherapists, doctors, nurses, occupational therapists and others who are involved in the care of the stroke survivors in the hospitals and sometimes in the homes.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Stroke

##### 2.1.1 Definitions

Stroke is described as a catastrophic event affecting all aspects of an individual's life (Nichols-Larsen et al. 2005). Since its earlier definition as an acute disturbance of focal or global cerebral function with symptoms lasting more than 24 hours or resulting in death with no apparent cause other than vascular by WHO (1988), new definitions of stroke are evolving to take care of the time criterion used in distinguishing stroke syndromes. The WHO's definition includes cerebral infarction and spontaneous cerebral haemorrhage but excludes stroke from other causes of neurological deficits such as tumors or trauma.

The evolving definition of stroke implements a tissue-based rather than time-based criterion of transient ischaemic attacks – TIAs from which a definition for stroke can be derived (Saver, 2008). Albers et al (2002) proposed a definition of TIA as a brief episode of neurological dysfunction caused by focal brain or retinal ischaemia with clinical symptoms lasting less than one hour and without evidence of acute infarction. A brief episode of neurologic dysfunction caused by focal brain or retinal ischaemia that last longer than 24 hours but recovers completely is known as cerebral infarction with transient symptoms – CITS (Caplan, 2006).

A completed stroke means the deficit has become maximal, usually within 6 hours while a stroke-in-evolution describes progression during the first 24 hours (Kumar and Clark, 1999). A first-ever stroke means a stroke that occurs in a person who has never had a stroke before (previous TIA is not considered a stroke) while stroke is considered recurrent when a person with a history of a previous stroke is registered with a new

stroke event (WHO, 2002). A patient with a non-fatal event is one who survives at least 28 days after the onset of the stroke while a fatal event denotes a stroke that resulted in death of the patient within 28 days (WHO, 2002).

Ischaemia or cerebral infarction may result from thrombosis of a cerebral artery, cerebral emboli or vasospasm (Ogungbo et al, 2005). Cerebral haemorrhage (subarachnoid or intra-cerebral) results from rupture of intracranial blood vessels leading to bleeding into the subarachnoid space or brain tissue (Ogungbo et al, 2004).

### 2.1.2 Epidemiology of Stroke

Incidence of stroke is increasing worldwide along with modernization (Kollen et al, 2006). It is the commonest neurological disorder worldwide, the third commonest medical condition in the developed world and the leading cause of disability among adults (Goldbeck, 2001; Fawcett et al, 2001). Lopez and Mathers (2006) reported stroke as the second commonest cause of death in all countries of different economic status, causing an estimated 5.54 million deaths worldwide annually (WHO, 2000). There has however, been an observed decrease in stroke incidence and mortality in Western countries in the past 20 years (Bejot et al, 2007).

Epidemiological data on stroke is limited in the developing countries where more than half of the world's population lives (Nicoletti et al, 2000). Although, comprehensive stroke surveillance data for Africa are lacking, the available data show that age-standardized mortality, case fatality and prevalence of disabling stroke in Africa are similar to or higher than those measured in most high income regions (Mensah, 2008). Hospital population studies from several African countries suggest an increasing morbidity and mortality from stroke (Cappucino et al, 2000).

The actual incidence and prevalence of stroke are still being established in Nigeria. Most of the epidemiological information available on stroke in Nigeria is from hospital data (Ogunniyi and Talabi, 2001). Ogungbo et al (2005) reported an increased incidence from 26 per 100,000 of the population studied by Osuntokun et al (1979) to

116 per 100,000. Danesi et al (2007) reported a crude prevalence rate of 1.14 per 1,000 (114/100,000) in a community-based study in Lagos, Nigeria which is lower than those in most developed countries. This difference may be related to lower incidence and higher mortality in developing countries (Danesi et al, 2007). At the University College Hospital (UCH), Ibadan, Nigeria, stroke accounted for 50.1% of neurological admissions to the medical wards between 1998 and 2003 and is therefore the most common cause of adult neurological admissions (Talabi, 2003). It was the commonest cause of neurological admissions and constituted 3.7% of all medical emergencies seen at the Lagos University Teaching Hospital (Ojini and Danesi, 2003) while at the Ogun State University Teaching Hospital, Sagamu, it accounted for 17% of medical deaths and was the third commonest cause of medical admissions (Ogun et al, 2000).

Ischaemic stroke accounts for 78% of all strokes while cerebral haemorrhage is responsible for the remaining 22% (INTERSTROKE, 2010). Hypertension remains the major risk factor for both ischaemic and haemorrhagic strokes (Bejot et al, 2007). In Africa, more than 90% of patients with haemorrhagic stroke and more than half with ischaemic stroke are found to have pre-stroke hypertension (Mensah, 2008).

### 2.1.3 The Burden of Stroke

Stroke is a major health problem in low income and middle income countries and accounts for almost 50% of total disease burden for the last decade (Strong et al, 2007). According to Strong et al (2007), an estimated 5.7 million people died from stroke in 2005 and there is a projected increase in death to 6.5 million in 2015. About 87% of total losses due to stroke in terms of Disability Adjusted Life Years (DALYs) are from low- and middle income countries (Lopez et al, 2006).

Stroke is a costly disease from human, family and societal perspectives (Di Carlo, 2009). The burden of stroke to individuals, families and societies is considerable (Young, 2001). This burden is underscored by the fact that stroke is a leading cause of disabilities – about 40% of stroke survivors have some degree of functional impairments (Young and Forster, 2007). Motor function affected by stroke includes

movement control, gait, muscle power, muscle tone, coordination and balance (Goldbeck, 2001). The most common deficit in stroke survivors is one-sided weakness or paralysis called hemiparesis or hemiplegia. Other neurological sequelae include: affections of vision – homonymous hemianopia; perception – unilateral neglect, attention deficit, memory loss; sensation-hemianesthesia, hemihypoesthesia, astereognosis and agrophesthesia; communication – dysphasia (Porter, 2003). Language difficulties may translate into difficulty in understanding directions for therapy or individuals with language difficulties may be limited in keeping tracks of their home activities (Fritz et al, 2006).

Although often neglected, informal carers are of paramount relevance to the maintenance of stroke survivors in the community. The need for support for daily activities directly impact on the quality of life of patients and their relatives who play the role of informal carers (Di Carlo, 2009).

## 2.2 Rehabilitation after Stroke

Most stroke survivors experience some degree of recovery over the succeeding months after the onset of stroke (Kwakkel et al, 2004). Stroke recovery is a life-long process filled with achievements and setbacks (Venkatasubramanian, 2008), and is greatly influenced by clinical and demographic characteristics of patients, with early rehabilitation having a likely role (Musicom et al, 2003). Recovery after stroke also depends on the patient's motivation, ability to learn, family support as well as the quality and intensity of therapy (Teasell et al, 2004). In the absence of any curative therapy, rehabilitation is the means to improved quality of life after stroke (Langhorne and Owen, 2001).

Rehabilitation is the active promotion of recovery (Gladman, 2000) which offers the opportunity to reduce the burden of disability associated with stroke (Teasell et al, 2004). It is an active and dynamic process through which an individual with impairments is helped to acquire knowledge and skills in order to maximise their physical, psychological, and social functioning (Barnes, 2003). The objective of stroke

rehabilitation is to enable individual patients to achieve their full potential and to maximize the benefits from training in order to attain the highest possible degree of physical and psychological performance (Kollen et al, 2006). The process is a continuum, starting within days of stroke onset and ending only when it no longer produces a positive effect (Venkatasubramanian et al, 2008).

Rehabilitation methods are essentially intended to reduce a person's disabilities and prevent onset of disabling situations in order to support an optimal quality of life (Talbot et al, 2004). This is achieved through a combination of reduction of impairment and learning of substitute and compensatory strategy (Venkatasubramanian et al, 2008). Effective rehabilitation improves functional outcome (Duncann et al, 2005). To be effective, rehabilitation requires a coordinated, inter-disciplinary approach involving regular team meetings as well as meetings with the patient and his family/careers (Venkatasubramanian et al, 2008). Evidence suggests that rehabilitation is more effective when given in patient's own environment (Wade, 2003). Swinton (2000) also noted that access to rehabilitation services in the client's home and community environment may help clients and partners remove barriers that limit resumption of past activities and improve quality of life.

In planning rehabilitation programmes, it is imperative that intervention priorities be centered on the needs expressed by the patients and for instance that the physical interventions for stroke are targeted at functional training such as dressing, transfers and gait (Talbot et al, 2004). Better knowledge of the needs of people with stroke in accomplishing the activities and social roles they value is essential for improving rehabilitation services because social participation is recognized as one of the goals of rehabilitation (Vincent et al, 2007). Wade (2003) postulated that rehabilitation services can be classified by their specialist skills (for example, spinal injury services), by the geographic location of the services (for example, in-patient stroke services, community-based stroke services), by the organization managing the service delivery (for example, social services rehabilitation services) and by location of service delivery.

Physiotherapy, an important component of stroke rehabilitation, is highly valued by stroke survivors (Kivakkal et al, 2004), probably because its effectiveness in stroke rehabilitation has been proven (Pollock et al, 2007). There are different treatment approaches to stroke management in physiotherapy. However, which type of physiotherapy should be provided for which patient remains uncertain (Young and Forster, 2007). There is therefore a need to identify and remove contextual barriers to patient involvement in the rehabilitation process so that the setting for rehabilitation might not in itself undermine the effectiveness of the rehabilitation (Holmqvist and vonKoch, 2001).

Common treatment approaches include the Bobath concept (Bobath, 1990), Brunstrom technique (Brunstrom, 1970), Rood method (Davies, 1985), Proprioceptive Neuromuscular Facilitation technique (Voss et al, 1985) and the Motor Relearning Theory (Anderson and Lough, 1986). The objective of stroke rehabilitation is to enable individual patients to achieve their full potentials and to maximize the benefits of their training in order to attain the highest possible degree of physical and psychological performance (Kollen et al, 2006).

### 2.2.1 Measures of Functional Recovery after Stroke

Functional recovery, defined as improvement in areas such as self-esteem, care and mobility, is multifunctional and more influenced by rehabilitation (Teasell et al, 2004). In stroke rehabilitation, as elsewhere in healthcare, properly constructed, valid and reliable measures are needed to discriminate among subjects' health status; to predict future states and to evaluate patient's outcome and the effectiveness of intervention (Gowland et al, 1993).

The instruments used to measure functional recovery in stroke include:

(a) Functional Independence Measure (FIM): The FIM was developed as a means of quantifying the amount of assistance and resources a disabled person will use in his living environment (Keith et al, 1987). The FIM comprises of 18 items that are scored on a 7-point scale from 1 to 7 (1 = minimum, 7 = maximum). The items cover independence in self-care, sphincter control, transfers, locomotion, communication and

social cognition. The FIM is a true measure of function and can be administered comparatively quickly. It illustrates improvement in neurological level and can be used to track down changes and analyse the outcome of rehabilitation. It has a reliability of about 0.89 to 1.0 and a validity ranging from 0.4 to 0.6 (Hall et al, 1999). However, it does not contain some items that might need to be measured for clinical purposes such as balance.

(b) Modified Rankin Scale (mRS): The mRS measures functional independence in activity performance of stroke patients and allows comparison between patients with different kinds of neurological deficit. The mRS grades disability from 0 to 6 (0 = no symptoms at all, 6 = dead). It is a valid, simple, reliable and consistent measure of disability which facilitates longitudinal comparison with baseline data (Hardie et al, 2004). It is good for differentiating between mild and moderate disability and avoiding ceiling effect (Weimar et al, 2002). It is interviewer-administered (Wilson et al, 2005).

(c) Modified Motor Assessment Scale (MMAS): The MMAS assesses the motor recovery of patients with stroke and is based on motor components of activities of daily living (Loewen and Anderson, 1988). It is a modification of the Motor Assessment Scale (MAS) developed by Carr et al (1985) to measure functional capabilities of patients with stroke. The item "general tonus" was deleted from the original MAS because of the subjectivity of testing it. The MMAS comprises of 8 items scored from 0 – 6 (0 = not possible, 6 = most difficult). The criteria for each point on the scale correspond to a description of the activity to be performed. The items are: (1) supine to side lying, (2) supine to sitting over side of bed, (3) balanced sitting, (4) sitting to standing, (5) walking, (6) upper arm function, (7) hand movements and (8) advanced hand activities.

The MMAS is interviewer-administered, brief and easily applied. It can be used as standardized assessment to quantify patients' progress during rehabilitation or as follow-up assessment to determine whether gains achieved by patients with stroke while hospitalized are maintained after discharge. It is a valid and reliable scale that provides objective measures of patient's progress over time (Loewen and Anderson, 1988). It is easy and quick to administer and has been used in researches in our



environment (Hamzat et al, 2006; Hamzat and Peters, 2009) and was therefore used in this study.

### 2.3 Stroke Rehabilitation in the Community

Traditionally, patients with stroke have received health services, including physiotherapy within a hospital setting (Thomas and Parry, 1996). This traditional institutional based approach to rehabilitation is expensive, often inappropriate, inefficient and does not meet the needs of most people with disabilities. Hence, health policy has shifted emphasis from institution to community care. Community-Based Rehabilitation (CBR) was developed as a response to criticism of the traditional model and as a means of delivering rehabilitation in primary health care settings (WCPT, 2003). It emerged from the World Health Organisation's vision of 'Health for All by 2000' as the rehabilitation counterpart of Primary Health Care - PHC (WHO, 1978).

Geddes and Chamberlain (2001) categorised community-based rehabilitation services in the United Kingdom as: Early Supported Rehabilitation in which patients are discharged home early from hospital and received most of their rehabilitation at home; Post-discharge rehabilitation – CBR following a period of in-patient rehabilitation; CBR provided when the patient is not admitted into hospital at all and late CBR provided well after the stroke event. Early supported discharge is the most widely investigated (Cochrane Database systematic Review, 2005). Community-Based Rehabilitation is care received in the community once the patients have passed the acute stage and have transitioned back to their homes or community environment (Canadian Stroke Strategy, 2006).

Introducing rehabilitation services at a local or community level removes, or reduces to minimum, the obstacles associated with traditional institutional care (Boyce et al, 2002). The study of Dabrzanska et al (2006) has demonstrated that patients who have had a stroke can be successfully rehabilitated in a community hospital, such as the Primary Health Centre at Oiyannin, Ibadan. Community hospitals, loosely defined as small hospitals with few on-site diagnostic facilities or specialized services are a long

established components of healthcare provisions (Young and Donaldson, 2001). Patients prefer the motivating environment of community hospitals because seeing others with similar conditions encourages them and gives them hope (Hale et al, 2003). Other studies have also shown that community-based exercise programmes can improve and retain mobility, functional capacity and balance and result in a demonstrable impact upon the performance of activities and abilities that are considered meaningful to the stroke subjects (Mayo et al, 2000; Hale et al, 2006; Eng et al, 2003). Hartman-Macir et al (2007) reported increased activity level and higher satisfaction scores in participants in a community-based rehabilitation programme. It has been suggested that community-based stroke rehabilitation programme may result in different or better outcomes compared to home-based stroke rehabilitation programme on account of isolation of the stroke survivor in HBR as well as loss and/or invasion of the privacy of the patient by healthcare provider (Hale, 2004).

### 2.3.1 Home-Based Rehabilitation

Rehabilitation services may be offered in the actual home of the person as home-based or domiciliary rehabilitation (Hiller and Inglis-Jassiem, 2010). The increasing cost of hospital-based rehabilitation has amplified the attractiveness of Home-based Rehabilitation – HBR (Eldar, 2000). The full impact of stroke may actually not become apparent until the patient has been home a few weeks and tries to get on with his or her life (Duncan et al, 2005). Delivering services in the home environment appears to be one of the mechanisms by which intervention improved outcome in terms of reintegration and physical health (Mayo et al, 2000). vonKoch et al (2000) claimed that being at home enabled patients to assume responsibility for and exert influence on their own rehabilitation.

Evidence of the effectiveness of home-based rehabilitation after discharge from hospital following stroke is available from several randomised controlled trials comparing home-based rehabilitation with institutional rehabilitation. Young and Forster (1993) reported a higher level of independence in activities of daily living, walking, stair climbing and social activity in participants in home-based rehabilitation

than institutional rehabilitation. Patients who receive rehabilitation in the home were also reported to have a better adjustment to residual disability (Anderson et al, 2000). However, earlier report had indicated that both are equally effective in terms of patient outcome (Gladman et al 1993). Other advantages of HBR include elimination of patient travel resulting in decreased cost and fatigue, increased treatment effectiveness and appropriate formulation of treatment goals relevant to the home environment (Young and Forster, 1992). There may however not be adequate floor space for exercises and decreased social interaction resulting in increased possibility of depression (Stephenson and Wiles, 2000).

### 2.3.2 Primary Health Care

The World Health Organization member states at the international conference held in Alma-Ata, USSR in 1978 recognized the need for broad health care services which could address the main health problems of a community, providing promotive, preventive, curative and rehabilitative services. This resulted in an international call for action on the development and implementation of primary health care. Primary health care (PHC) is essential health care based on practical, scientifically sound and socially acceptable methods and appropriate technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain (WHO, 1978).

The term 'appropriate technology' in the Declaration of Alma-Ata, criticized the creation of urban hospitals in developing countries (Cueto, 2004). According to Cueto (2004), these institutions were perceived as promoting a dependent consumer culture benefiting a minority and draining a substantial share of scarce funds and manpower. Thus, PHC is about taking away the almost overwhelming focus on hospitals and breaking down the barriers that exist between patients and healthcare providers. It plays a central role in health care systems worldwide by offering families cost-effective services close to home, eliminating costly trips to specialists and hospitals (Disease Control Priorities Project, 2007).

Primary health care is sometimes used interchangeably with primary care but both are not exactly the same. The goal of PHC is to incorporate the components of primary care which is the first point of contact with the health care system (Fricke, 2005). Alternatively, PHC in addition to primary care recognizes the broader determinants of health including population health, sickness prevention and health promotion (Health Canada, 2000). Care at this level does not only include the diagnosis and treatment of the problem but can also incorporate rehabilitation, health promotion and disease prevention as well as social integration (Fricke, 2005).

Primary health care services can take place in an assortment of settings such as health clinics, schools and community health centres (Fricke, 2005). It was suggested that there should be a fundamental shift from the rigid pyramidal structures that have prevailed in the health sector to adaptable networks that improve access to all levels of care (Frenk, 2009). According to Frenk (2009), this involves moving from health centres where human and technological resources are concentrated into health spaces which extend the reach of comprehensive care into schools, workplaces, recreational areas and the homes of those who live with a chronic condition. PHC was designed as the new centre of the public health system (Cueto, 2004).

In a study assessing patients' perceptions of primary health care in a low-income inner city practice in the United Kingdom, Flannay et al (1997) found that patients were more satisfied with primary care than with other aspects of primary health care, such as housing. Physiotherapy, chiropody and pharmacy were reported as the services most requested at the health centre (Flannay et al, 1997). Soever (2006) found a broad evidence to indicate that physiotherapy intervention within a PHC framework can have an important impact on system-level, provider-level and client-level outcomes. However, at the present time physiotherapists are not to any great extent seen as major participants in PHC models of service delivery. To fully engage as PHC providers, physiotherapists must embrace the role of community therapist (Fricke, 2005).

Nigeria launched its Primary Health Care plan (PHC) in 1987. The then military president – General Ibrahim Babangida announced PHC as the cornerstone of health policy. Its main stated objectives included accelerated health care personnel development, improved collection and monitoring of health data, ensured availability of essential drugs in all areas of the country; implementation of an Expanded Programme on Immunization (EPI), improved nutrition throughout the country, promotion of health awareness, development of a national family health programme and widespread promotion of oral rehydration therapy for treatment of diarrhoea in infants and children. From the above stated objectives, it is apparent that the rehabilitation of people with chronic diseases such as stroke was omitted from the Nigerian PHC policy. This is out of congruence with the WHO's stated objectives of PHC.

#### 2.4 Community Reintegration after Stroke

One of the most important elements of stroke rehabilitation, and possibly the most underestimated area, is community reintegration (Teasell, 2004). Sudden onset of disability following a stroke represents a major disruption of the continuity of a person's life experience (Cott et al, 2007). Comprehensive stroke rehabilitation is a multi-dimensional process consisting of prevention and treatment of medical complications, restoration of maximal independent functioning, facilitation of psychosocial coping and adaptation by the patient and family, promotion of community integration and enhancing quality of life for stroke survivors (Roth et al, 1998). According to Trigg and Wood (2000), one of the aims of rehabilitation is to reintegrate patients to a level of functioning whereby they are able to make the same choices and enjoy a lifestyle similar to what they had prior to stroke.

Reintegration is the ability to function and do what one wants to do or feels one has to do without necessarily being free of symptoms, disability or help in form of human assistance or mechanical devices (Wood-Dauphinee et al, 1988). Reintegration into the society ensures that rehabilitation achievements are sustained in the long-term (Gladman, 2000). The concept of reintegration is closely allied to functional

performance and the degree of reintegration achieved by patients after an incapacitating illness is seen as contributing to the quality of their lives (Wood-Dauphinee and Williams, 1987). Quality of life is defined as individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns (WHOQOL Group, 2002). Enhancing quality of life is regarded as an inherent goal of rehabilitation services and programmes because of their focus on interventions to minimize the impact of pain, physical and cognitive impairment, and on enhancing participation in work and everyday activities (Eng and Miller, 2008).

Participation refers to the involvement of an individual in life situations in relation to health conditions, bodily functions and structures, activities and contextual factors (WHO, 2001). The characteristics of a person's environment such as support from the family and utilization of health and social services, affect social participation after stroke (Vincent et al, 2007). These authors stated further that the presence of handicap situations in areas such as interpersonal relationships, mobility and leisure can isolate the person and foster the development of secondary disabilities if appropriate interventions are not offered. Teasell et al (2004) also noted that failure to mobilize adequate support in the community can potentially negate the best efforts/results of stroke rehabilitation.

#### **2.4.1 Factors Influencing Community Reintegration**

Community reintegration, as a proxy to quality of life (Wood-Dauphinee and Williams, 1987), can be affected by factors that influence quality of life. These include: **Depressive Symptoms and Physical Disability:** These are the factors that contribute most to an impairment of reintegration in stroke patients (Carter et al, 2000). Stroke patients with depression and massive physical disabilities have difficulties reintegrating into the community.

**Balance Self Efficacy:** Pang et al (2007) in a study involving older adults living with stroke, found balance self efficacy to be an independent predictor of satisfaction with

community reintegration. They stated further that improving balance self efficacy may enhance community reintegration in this population.

**Age:** Failure to return to work was related to older age among stroke survivors (Carter et al, 2000). Patel et al (2007) reported a contrary finding of worse mental and physical health in younger subjects. This, they claimed may be due to either the lesser ability of younger victims to cope psychologically with stroke or their higher expectations of health.

Also gender is reported to have impact on quality of life with females having lesser quality of life which may also be culturally related. Co-morbidities; availability of social support; stroke type and concordance also affect quality of life in stroke (Carter et al, 2000).

#### 2.4.2 Measures of Community Reintegration

The impact of disease and treatment on patients' lives is frequently measured by endpoints such as health status, well-being and quality of life (Piercy et al, 2000). Some of the outcome measures used to assess the effect of an incapacitating disease on resumption of normal life are:

(a) **Frenchay Activities Index (FAI):** The FAI measures social function or lifestyle and handicap after stroke (Holbrook and Skilbeck, 1983). It comprises of 15 items related to normal activities. Each item is rated on a 4-point scale from 0 to 3. The items are: preparing meals, washing up, washing clothes, light housework, heavy housework, local shopping, social outings, walking outside for greater than 15 minutes, actively pursuing hobbies, driving/bus travel, outing/car rides, gardening, household/car maintenance, reading books and gainful employment (Schuling et al, 1993; Piercy et al, 2000). It has been proven to be a valid and reliable instrument. The Spearman's rho correlation coefficient for FAI is 0.93 (Piercy et al, 2000).

(b) **Subjective Index of Physical and Social Outcome (SIPSO):** The SIPSO is a brief, self-completed measure of physical and social outcome following stroke as well satisfaction with functional status (Trigg and Wood, 2000). It consists of 10 items scored on a scale of 0 to 4. The higher the score, the higher the level of integration. The items cover areas like physical functioning or mobility, social interaction, boredom and

self image. It is a valid and reliable measure of reintegration to pre-stroke lifestyle and has a test-retest reliability with intra-class correlation coefficient of 0.96 (Trigg and Wood, 2003).

(c) **Reintegration to Normal Living Index (RNLI):** The RNLI was developed as a measure of global function status of patients by Wood-Dauphinee et al (1988). It assesses the consequences of disease upon the resumption of normal life (Daneski et al, 2003). It comprises of 11 declarative statements. It has 2 subscales: daily activities subscale comprising of statements 1 – 8 and perception of self subscale comprising of statements 9 – 11. Scoring is based on distance along a 10 cm visual scale where 0 = 'does not describe my situation' and 10 = 'fully describes my situation'. Overall Score is adjusted algebraically as:

$$(\text{total score})/110 \times 100 \text{ (Wood-Dauphinee et al, 1988).}$$

It was modified by Daneski et al (2002) to form the RNLI-I' which uses an 'agree/disagree' format as alternatives. Responses were scored 0 for disagree and 1 for agree giving a maximum score of 11. The modified version has been shown not to be sensitive to changes. The original index has a test-retest reliability of 0.83 and an internal consistency ranging between 0.76 and 0.90 for community dwelling elderly (Wood-Dauphinee et al, 1988). It has been used in studies involving reintegration of stroke survivors (Mayo et al, 2000; Markle-Rent et al, 2011). The original instrument was used in this study to assess community reintegration of stroke survivors.



## CHAPTER THREE

### MATERIALS AND METHODS

#### 3.1 Participants

A total of 65 stroke survivors were approached for this study. Only 56 gave their consent to participate in the study. The 56 consenting individuals had first incidence stroke and were consecutively recruited from the medical wards and the physiotherapy clinics of the University College Hospital, Ibadan and Adeoyo Maternity Teaching Hospital, Ibadan. They were randomly assigned into either the Primary Health Care Group (PHCG, n=29) or the Home Group (HG, n=27) using the fish bowl method of random assignment. Fifty-two individuals comprising 25 PHCG and 27 HG participants however completed the study. Four participants dropped out from the PHCG because of their preference for the HG. Participants in the PHCG and HG were treated at the primary health centre, Oniyantin, Ibadan and their homes respectively.

#### Inclusion Criteria

Stroke survivors who met the following inclusion criteria participated in the study:

- i. Stroke survivors with first incident stroke who at the point of recruitment had not stayed more than 2 weeks at home after discharge from the hospital.
- ii. Stroke survivors who were not aphasic and could comprehend and follow a 3-step command (minimal or no cognitive impairment) as well as give informed consent.

#### Exclusion Criteria

Stroke survivors with the following criteria were excluded from the study:

- i. Individuals with strokes from non-vascular origin
- ii. Stroke survivors with severe or uncontrolled hypertension.
- iii. Stroke survivors from whom informed consent could not be obtained.

## 3.2 Materials

The following materials were used in the course of this study:

- (a) **Stroke Levity Scale (SLS):** The SLS was used to measure the severity of stroke in the participants at the point of recruitment into the study. It is a 4-item scale. The items in the scale are extremities function (upper and lower limbs), aphasia and mobility (Owolabi and Platz, 2008). Extremity function is graded on a scale of 0 - 5, aphasia on a scale of 0 - 1 while mobility is graded from 1 - 5 (appendix A). Score ranges from a minimum of 1 to a maximum of 15. The SLS has an internal reliability with a Cronbach's  $\alpha$  of 0.75. It is a concise, simple, reliable and valid stroke impairment scale (Owolabi and Platz, 2008). It is interviewer-administered. Only participants with mild (11 to 15) to moderate (6 to 10) stroke severity were included in the study.
- (b) **Modified Motor Assessment Scale (MMAS):** The MMAS was used to measure the motor function ability of participants. It assesses the motor recovery of patients with stroke and is based on motor components of activities of daily living (Loewen and Anderson, 1988). It is a modification of the motor assessment scale. The MMAS comprises of 8 items that are assigned a score from 0 - 6 pertaining to upper extremity motor recovery, balance and function (appendix B). The MMAS is interviewer - administered, brief and easy to administer. It has an inter-rater reliability of 0.95 and a test-retest reliability of 0.98.
- (c) **Short-Form Postural Assessment Scale for Stroke (SFPASS):** The SFPASS was used to assess postural balance of participants. The SFPASS was developed from the Postural Assessment Scale for Stroke (PASS) which is a measure of postural balance in stroke patients (Chien et al, 2007). It consists of 5 items scored on a 3 level scale ranging from 0 to 3 (appendix C). It is simple and fast to administer. The SFPASS has a reliability of 0.93, a concurrent validity of 0.98 with the original PASS and a predictive validity of 0.82 (Chien et al, 2007). It is interviewer - administered.
- (d) **Reintegration to Normal Living Index (RNLI):** The RNLI was used to assess the reintegration (handicap) level of participants. The RNLI is an 11-item scale that covers areas such as participation in recreational and social activities, movement within the community and how comfortable the individual is in his role in the family and other relationships (Mayo et al, 2000). Scoring is

based on distance along a 10cm visual scale (0 = no integration, 10 = complete reintegration). Score is adjusted to a percentage indicating the degree of reintegration thus:

$$(\text{total score})/110 \times 100 \text{ (Wood-Dauphinee et al. 1988).}$$

The higher the score, the higher the integration. The RNLI is easy to administer and is responsive to changes in the clinical status of patients.

- (e) **Health-Related Quality Of Life In Stroke Patients (HRQLISP):** The HRQLISP was used to assess the quality of life in the participants pre- and post-intervention. The HRQLISP is a stroke-specific and patient-centred measure encompassing two dimensions and seven domains. The physical dimension includes the physical, emotional, intellectual and socio-social domains whilst the spiritual dimension comprises the soul, spirit and spiritual interaction domains (appendix E). It has a reliability ranging from 0.72 - 0.85 Cronbach's alpha and has been validated for use in this environment (Owolabi and Ogunniyi, 2009). It has a Yoruba version which has been used and validated for this environment (Owolabi and Ogunniyi, 2009). Both versions of the HRQLISP were used in this study depending on the language proficiency of the participant.
- (f) **Berg Balance Scale:** The domains of this scale were used to train balance in the participants.
- (g) **Sandbags** of various sizes (from 0.5kg to 4.0kg) used for strengthening muscles of the affected upper and lower extremities.
- (h) **Sphygmomanometer and Stethoscope:** A mercury-in-glass sphygmomanometer (Accoson, England) and a stethoscope (Littman, U.S.A) were used to measure participants' blood pressure in mmHg.
- (i) **Examination table:** 50-cm high examination table was used to perform the items 1 and 2 of the SFPASS (Chien et al, 2007).
- (j) **Wooden block** of 23cm was used during the step standing exercise of balance training.
- (k) **2 Chairs** of 58cm in height and 75cm in width was used to train transfer activities. One of the chairs had armrests while the other did have armrests.
- (l) **Two weighing scales:** Two bathroom weighing scales (Hanson, Ireland) were used to measure weight distribution on the lower limbs of participants to the nearest 10kg.

- (m) Stop Watch (Ticmate, Heuer) was used to measure the time taken in seconds, to cover the central six meters of the 10-meter walkway.
- (n) 10-meter walkway was measured and mapped out on participants' corridors and at the primary health centre, Oniyarin, Ibadan.

### 3.3 Methods

#### 3.3.1 Research Design

The study employed a quasi-experimental research design (randomised controlled clinical trial) involving an evaluation of the comparative effects of the developed PHCPP on selected indices of recovery among stroke survivors treated at the primary health centre, Oniyarin and those treated at their respective homes. The participants treated at their homes constituted the control group.

#### 3.3.2 Sampling Technique

Consenting patients who met the inclusion criteria were recruited consecutively into the study from the medical wards and the physiotherapy clinics of the University College Hospital, Ibadan and Adeoyo Maternity Teaching Hospital, Ibadan. The recruitment at the medical wards was carried out at the point of discharge. Grouping was achieved by random assignment into either the Primary Health Care Group or the Home Groups using the fish bowl method.

#### 3.3.3 Sample Size Determination

The sample size (N) was determined using the Cohen's table at  $\alpha = 0.05$ , degree of freedom ( $u = k - 1$ ), where  $k$  is the number of groups i.e. 2. Therefore, at  $\alpha = 0.05$ ,  $u = 1$ , effect size ( $f = 0.35$  (medium value) and power ( $w = 0.70$ ), group sample size ( $n = 26$ ). Sample size (N) for the study was determined as minimum of 52 participants (Portney and Watkins, 2000).

#### 3.3.4 Procedure

Ethical approval was obtained from the University of Ibadan/University College Hospital Health Research Ethics Committee (appendix F). The nature and objective of the procedure for the study were explained to the participants after which their informed consents were sought and obtained. Permission was also obtained from the authority of the primary health centre, Oniyarin, Ibadan (appendix G).

- (a) The severity of stroke (SS) of the participants was measured at the point of recruitment into the study using the SLS. This was calculated as the sum of maximum muscle power (MP) in the dextrous upper limb, maximum muscle power in the affected lower limb and mobility score. Each of the 3 items was graded on a 6-point scale from 0 – 5. The maximum obtainable score was 15 from which 1 was deducted if aphasia was present (Owolabi and Platz, 2008).  

$$SS = MP(\text{dextrous UL}) + MP(\text{affected LL}) + \text{Mobility score} - 1 \text{ (if aphasic)}$$
- (b) The baseline motor function ability of the participants was assessed at the point of recruitment into the study using the MMAS. This was done by requesting each participant to carry out the series of tasks in the instrument namely: rolling from supine to side-lying, moving from supine to sitting over side of bed, balanced sitting, walking, upper arm function, hand movements and advance hand activities (appendix B). Quality of performance of some items under the tasks and speed of performance of some other items were assessed based on the criteria for scoring each task as listed in appendix B (Carr et al, 1985).
- (c) Baseline postural balance of each participant was assessed using the Short Form Postural Assessment Scale for Stroke (SFPASS). Participants were required to carry out the 5 tasks on the scale viz-a-viz: sitting on the edge of the table to supine, supine to sitting up on the edge of the table, sitting to standing up, standing up to sitting down and standing on non-paretic lower limb. Independence in performance of task was graded on a 3-point scale (0, 1.5, and 3). The maximum obtainable score was 15 (Chien et al, 2007).
- (d) Level of reintegration into the community post-stroke was assessed using the RNL. Participants responded to 11 declarative statements using a visual scale. The scale is from 0 – 10, where 0 means 'does not describe my situation' while 10 means 'fully describes my situation'. Participants indicated the level to which each statement described their individual situation on the scale. The maximum obtainable score was 110. The RNL score for each participant was calculated by converting the total score divided by the maximum obtainable score into a percentage as shown below:  

$$(\text{total score}) / 110 \times 100 \text{ (Wood-Dauphinee et al, 1988)}$$
- (e) Quality of life of the participants was measured using the Health-Related Quality of Life In Stroke Patients (HRQLISP). The HRQLISP also served as the data collection form for socio-demographic and clinical data of participants.

Participants were expected to respond to the set of questions under each of the 7 domains. Each question has specific scores attached as shown in appendix E. Total score for each domain was converted into a percentage score. Total HRQLISP score was determined by finding the mean of the domain scores as indicated below:

$(\%Physical + \%emotional + \%intellectual + \%soul + \%spirit + \%ecosocial + \%spiritual\ interaction) / 7$ .

- (f) Standing asymmetry ratio: Weight distribution on the lower limbs was measured using two weighing scales placed at a lateral distance of 20cm apart at the position of the first metatarsal heads (Bohannon and Waldron, 1991). Participants were instructed to stand barefooted with one foot each on each weighing scale and maintain as much balance as possible while standing upright. With the participant looking straight ahead, the researcher read off the weight distribution on each weighing scale to the nearest 1.0kg (Plate 1). The sum of the two readings was equivalent to the total body weight. The values obtained were subsequently converted to a percent of the total body weight for each lower limb. An asymmetry ratio was then calculated as follows:

$\frac{\% \text{ body weight on unaffected lower limb}}$

$\% \text{ body weight on affected lower limb (Caldwell et al. 1986)}$ .

- (g) Walking speed: A 10-metre walkway was mapped out on the floor using a metre rule. Participants were then required to step on the walkway and walk it to the end at his or her preferred speed (Plate 2). Ambulation for the central 6-metre area was timed and recorded with the stopwatch. Ambulation within the first and last 2-metre areas of the walkway were not recorded to eliminate the effect of the acceleration that occurs when the foot is lifted off the floor and the deceleration that occurs when the swinging leg slows down in preparation for contact with the floor (Magee, 1997). The stopwatch was started on the first contact of the right foot after the subject has passed the first 2-metre mark and was stopped on the final right heel contact before the subject passed the beginning of the last 2-metre mark. Walking speed was measured by dividing the distance (6 metres) by the time taken to cover the distance. It was recorded in metres per seconds.



Plate 3.1. Participant standing on two weighing scales to determine weight distribution while Blinded Observer look readings.



Plate 3.2. Participants performing the 10-metre walk while the Blinded Observer timed the central 6-metre walk



## THE STUDY PHASES

### Phase 1: Developing the treatment Protocol

The treatment tool used in this study is a Primary Health Care-based Physiotherapy Protocol (PHICPP). The development of the PHICPP was informed by the need to have a physiotherapy protocol that is simple, easy to use and not technologically driven. This is because the rehabilitation of stroke survivors in secondary and tertiary healthcare institution where they go to for rehabilitation services is becoming increasingly equipment-based and out of the reach of the average stroke survivor. In line with the Declaration of Alma – Ata, it is imperative to use appropriate technology for effective implementation of Primary Health Care services. In a country like Nigeria, appropriate technology that the community and country can maintain will be one that is not electricity dependent. This provided the justification for the development of the PHICPP.

A search of existing literature on current trends and areas of emphasis in stroke management was carried out. A review of published studies on trends in stroke management and evidence-based stroke management was done through a Pubmed and PEDro search. Search strings used were 'physiotherapy in primary health care', 'stroke rehabilitation in primary health care', 'current trends in stroke rehabilitation' and 'physiotherapy in stroke rehabilitation'. The date limit was set from 2004 to 2008. 116 articles were retrieved but only 47 articles (full free text articles, articles in portable data format – PDF and abstracts of articles) addressed the area of interest. The literature search combined with cursory observation in the clinics led to development of the PHICPP with focus on four key areas of difficulty and changes in physical functioning of stroke survivors.

Hence, the PHICPP comprised of structured exercise programmes to improve strength, balance, gait and bimanual activities. Established treatment approaches were synthesised to develop the Primary Health Care Physiotherapy Protocol (PHICPP). The PHICPP was used as treatment in this study. They consisted of:

(a) Assistive and resistive exercises using Proprioceptive Neuromuscular Facilitation (PNF) patterns to the muscle groups of the upper and lower limbs. This is a method of treatment in which the physiotherapist facilitates the achievement of specific movement patterns by the patient with particular use of the therapist's

hands (Jackson, 2004). The PNF exercises include upper and lower extremities patterns. The movement patterns are in diagonals. Assistance and resistance are manually given and is subjective, based on what each participant can tolerate. PNF patterns were used until there was adequate strength (as assessed by the therapist) in the extremities for the use of mechanical resistance (free weights). Resistance was increased when patient could complete two sets of 10 repetitions of each movement through the available range of motion.

(b) Balance training was carried out using the Berg Balance Scale domains (Au-Yeung et al, 2003; Hamzat and Fashoyin, 2007). Participants carried out the following tasks:

- i) Standing unsupported: The patient stood from sitting without holding on to anything and remained standing unsupported for 2 minutes. Progression was by increasing the activity by one repetition and the duration of standing by 10 seconds weekly.
- ii) Sitting unsupported with feet on the floor which entailed the patient sitting with back unsupported and arms folded for 2 minutes. This was progressed by a 10 seconds increase weekly.
- iii) Transfer activities: Moving from chair to bed and back again – with and without armrests. This was increased by one repetition weekly.
- iv) Standing unsupported with eyes closed for 10 seconds which was increased by two seconds weekly.
- v) Standing unsupported with feet together. Patient placed feet together and stood without holding on to anything for 10 seconds. The duration was increased by 10 seconds weekly.
- vi) Reaching forward with outstretched arms while standing. Patient lifted arms to 90°, stretched fingers out and reached forward as far as possible. This was increased by one repetition weekly.
- vii) Retrieving object from floor: involved picking up shoe / slipper in front of feet with standing as the starting position. It was increased by one repetition weekly.
- viii) Turning to look behind over left and right shoulders while standing which was increased by one repetition weekly.
- ix) Turning 360° completely around in a full circle, pause and then turn a full circle in the other direction within 4 seconds. Progression was by increasing the activity by one repetition weekly.

- x) Stool stepping by placing each foot alternately on the stool until each foot has stepped the stool four times. This was increased by one repetition weekly.
- xi) Tandem stance: involved standing unsupported with one foot in front of the other. Where this was not possible, the foot in front was moved ahead of the one at the back as much as possible with the heel of the forward foot directly in front of the toes of the backward foot for 30 seconds. It was increased by 5 seconds weekly.
- xii) Standing on affected leg without holding on to anything for 15 seconds which was increased by 3 seconds weekly.
- (c) Functional activities of the affected upper limb were trained using a combination of self-assisted exercises and task-oriented functional activities. The self-assisted exercises consisted of exercises the patient can carry out by himself or herself using the unaffected extremities. The task-oriented activities consisted of a battery of tasks that are needed for normal activities of daily living such as opening doors, buttoning and un-buttoning clothes, screwing and unscrewing bolts and nuts (Pfaltz 3). Progression was by withdrawing assistance given, increasing the complexity of task and the speed of carrying out the task.

#### **Phase 2: Administration of the Primary Health Care- Based Physiotherapy Protocol**

The PHICPP was used as the intervention for the 2 groups. In addition to the PHICPP, pain was treated where indicated using soft tissue massage. Participants in the PHCG were treated at the primary health centre, Onlyanrin. Participants in HG were treated at their respective homes.

#### **Phase 3: Evaluating the efficacy of the PHICPP in the two groups**

Two research assistants who were licensed physiotherapist were engaged in the research. Baseline and follow-up assessments (at the 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup> and 10<sup>th</sup> weeks) of motor function, postural balance and community reintegration were carried out using the MMAS, SFPASS and the RNLI respectively by one of the research assistants who was not involved in the treatment of the participants (Blinded Observer- BO). Quality of life, asymmetry ratio and walking speed were measured at baseline and at 10 weeks for the two groups. The second research assistant (RI) worked in conjunction with the researcher to administer the PHICPP on the two groups of participants.

# HAND FUNCTION BOARD

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ALPHASIS PHYSIOTHERAPY AND FITNESS CENTRE  
25, Sadiqul Ahsan, Parkin, Ibadan  
Tel: 0800 274 0000, 0800 223 1000



Plate 3.3. Hand function board used for training bimanual activities

A pilot study was carried out to train the research assistant (RI) on the PHCPP and the mode of treatment to ensure standard compliance with the protocol. The researcher and the research assistant (RI) alternated treatment for all participants in both groups. Thus, each participant had ten (10) treatment contacts with each of the researcher and the research assistant (RI).

**Treatment Schedule:** Each treatment session lasted about 60 minutes. Participants were allowed to rest in-between exercises and also allowed to stop based on their individual tolerance. The intervention was carried out 2 times a week with 2 days interval between treatment days for 10 consecutive weeks. Progression of treatment activities was based on individual participant's tolerance and performance.

### 3.1 Data Analyses

1. Descriptive statistics of mean and percentages was used to summarize the demographic and clinical characteristics of participants in the two groups.
2. Paired t-test was used to compare the pre- and week 10 scores of each of quality of life, asymmetry ratio and walking speed within each of the two groups.
3. Independent t-test was used for between-group comparisons of quality of life, asymmetry ratio and walking speed.
4. Friedman's test was used to compare motor function, postural balance and community reintegration over the 10 weeks within the 2 groups.
5. General Linear Model for Repeated Measures was used for between-group comparisons of motor function, postural balance and community reintegration. Bonferroni post hoc was used to adjust for gender. Level of significance was set at  $\alpha = 0.05$ .

## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### 4.1 Results

##### 4.1.1 Development of the Primary Health Care-based Physiotherapy Protocol

The identified areas of focus in stroke rehabilitation were restoration of balance and function, community reintegration and community ambulation, task-oriented approach of training function and improving quality of life. Equivocal evidence was found for strength training in the affected extremities. Balance training, functional ability that translates to improvement in activities of daily living and improving quality of life have high level of evidence (7-8/10). The emphasis in achieving these identified goals was on the use of repetitive task-oriented techniques of management.

The literature search combined with cursory observation in the clinics led to development of the PHCYP with focus on four key areas of difficulty and changes in physical functioning of stroke survivors. Hence, the PHCYP comprised of structured exercise programmes to improve strength, balance, gait and bimanual activities (appendix H). These exercises have been used singly and in conjunction with other exercises in the management of stroke survivors both in the community and in hospital settings there were no published article or manual in which they were brought together as a treatment protocol that could be used or followed in the management of stroke patients. Each treatment approach had been proven to have its own singular merits.

##### 4.1.2 Demographic and Clinical Characteristics of the Participants

A total of 56 (27 males, 29 females) consenting stroke survivors who met the inclusion criteria were consecutively recruited for this study. They were randomly assigned into either the Primary Health Care Group (PHCG, n=29) or the Home

Group (HG, n=27). However, 52 individuals comprising of 24 males and 28 females completed the 10-week treatment programme. Twenty-five were in the PHCG (7 males and 18 females) while 27 were in the HG (17 males and 10 females). Four of the participants allocated to the PHCG withdrew their consent after group assignment giving a drop-out rate of 7.14%. The patients dropped out because their preferred group was the HG. Those who completed the study were similar in demographic and clinical characteristics to those who dropped out.

The PHCG and HG were comparable in terms of age, limb dominance, side of affection, and socio-economic status but differed significantly in terms of gender distribution. The number of males in the home group was significantly higher than the females whereas there were more females in the PHC group ( $p = 0.01$ ). The mean age of the participants in the PHCG was  $60.6 \pm 10.2$  years while the mean age for HG was  $61.7 \pm 8.4$  years. Almost all the participants in the PHCG and the HG had right limb dominance (96.0% and 92.6% respectively). The demographic and clinical characteristics of the participants are presented in Table 1.

Nearly half of the participants in the PHCG (48.0%) had past medical history of hypertension, 44.0% were unaware or ignorant of any medical illness immediately prior to onset of stroke while 8.0% had history of diabetes and hypertension (Figure 1). Majority of the participants in the HG (59.3%) were previously diagnosed to have hypertension, 33.3% claimed they were unaware of any medical illness prior to the onset of stroke while 7.4% had history of diabetes and hypertension (Figure 1).

#### 4.1.3 Changes in Motor Function Scores (MMAS) of Participants over 10 weeks

Table 2 shows the changes in motor function ability scores of the participants in the PHC group over the 10-week period while changes in motor function ability in the Home group is as presented in table 3. Both the PHC and Home groups showed a statistically significant increase in the motor function scores ( $\chi^2 = 112.31, p = 0.01; \chi^2 = 117.92, p = 0.01$  respectively) in response to treatment with the PHCPT with the Friedman test. The motor function scores continue to increase linearly in the PHCG from  $22.9 \pm 15.2$  at baseline to  $34.7 \pm 11.7$  at week 10 while the HG had a linear

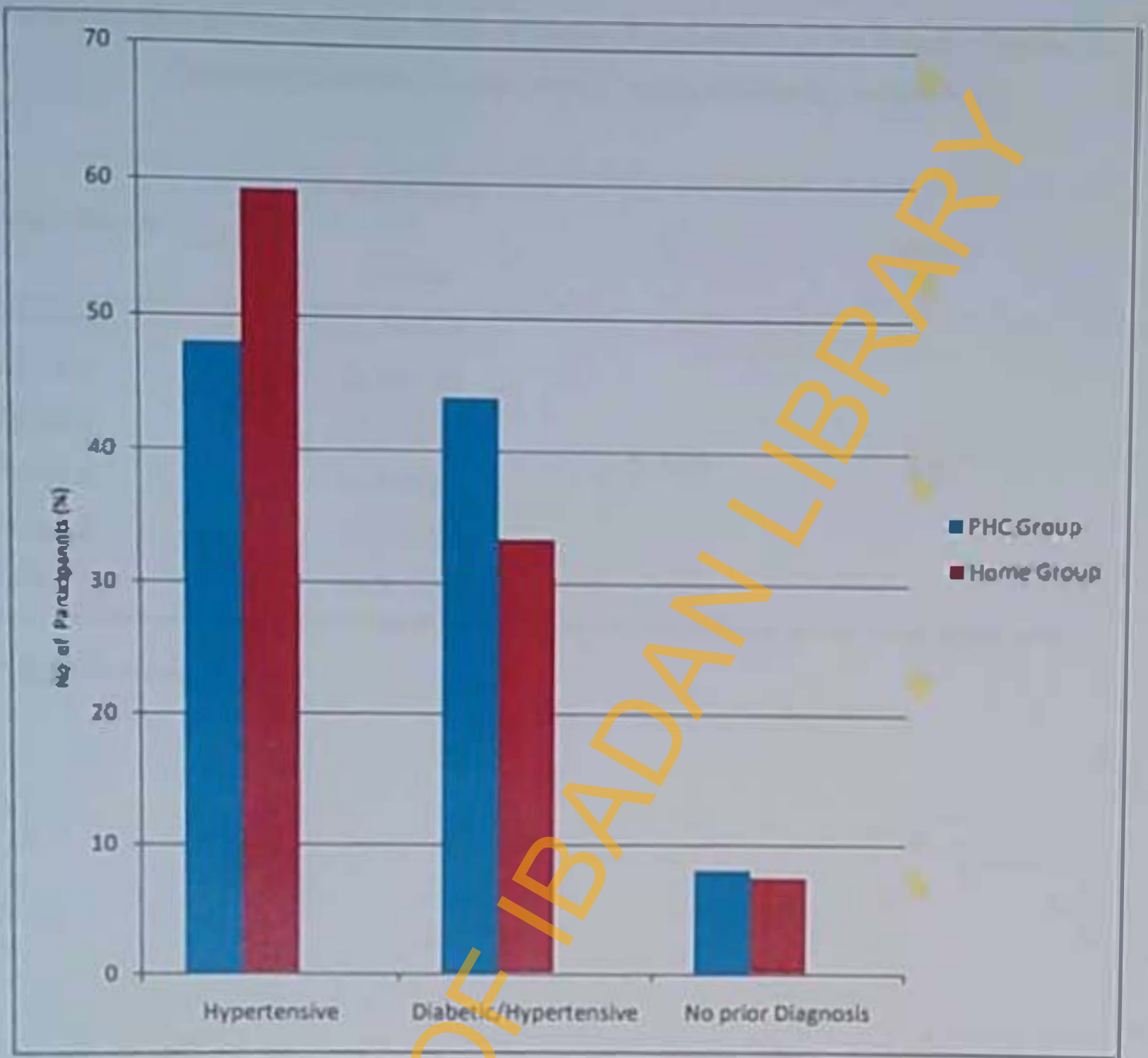
**Table 4.1. Demographic and Clinical Characteristics of Participants (N =52)**

Characteristics	PHC Group		Home Group		$\chi^2$	p-value
	n	(%)	n	(%)		
<b>Gender</b>						
Male	7	(28.0)	17	(63.0)	6.38	0.01
Female	18	(72.0)	10	(32.0)		
<b>Marital Status</b>						
Single	1	(4.0)	5	(18.5)	5.62	0.06
Married	21	(84.0)	22	(81.5)		
Widowed	3	(12.0)	0	(0.0)		
<b>Highest Education</b>						
None	4	(16.0)	5	(18.5)	2.39	0.49
Primary	9	(36.0)	5	(18.5)		
Secondary	7	(28.0)	8	(29.6)		
Tertiary	5	(20.0)	9	(33.5)		
<b>Limb Dominance</b>						
Right	24	(96.0)	25	(92.6)	0.27	0.59
Left	1	(4.0)	2	(7.4)		
<b>Side of Affection</b>						
Left	18	(68.0)	18	(66.7)	0.92	1.00
Right	8	(32.0)	9	(33.3)		
Mean Age (years)	60.6±10.2		61.7±8.4		0.67	

**Key:**

PHC Group = Primary Health Care Group





**Key:**

PHC = Primary Health Care

Figure 4.1. Distribution of participants in the Primary Health Care and Home groups by past medical history.

Table 4.2. Comparison of motor function scores of participants in the Primary Health Care group from baseline to week 10 using Friedman's test (N = 25)

Time Frame	Mean scores	$\chi^2$	p-value
	$\bar{x} \pm S.D$		
Baseline	22.9 $\pm$ 15.2	112.31	0.01*
Week 2	26.3 $\pm$ 13.9		
Week 4	29.5 $\pm$ 13.2		
Week 6	30.8 $\pm$ 12.8		
Week 8	32.4 $\pm$ 12.7		
Week 10	34.7 $\pm$ 11.7		

\* Significant at  $p < 0.05$

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Table 4.3. Comparison of motor function scores of participants in the Home group from baseline to week 10 using Friedman's test (N = 27)

Time Frame	Mean scores	$\chi^2$	p-value
	$\bar{x} \pm S.D$		
Baseline	19.9 ± 16.4	117.92	0.01*
Week 2	24.4 ± 14.5		
Week 4	28.4 ± 13.0		
Week 6	31.6 ± 11.7		
Week 8	34.2 ± 11.2		
Week 10	36.6 ± 10.3		

\*Significant at  $p < 0.05$

increase from  $19.9 \pm 16.4$  at baseline to  $36.6 \pm 10.3$  at week 10. That is, there was a time – trend effect in the increase in both groups (Figure 2). There was however, no statistically significant difference ( $p = 0.94$ ) in the mean scores between the two groups at each time of assessment over the 10-week period (Table 4).

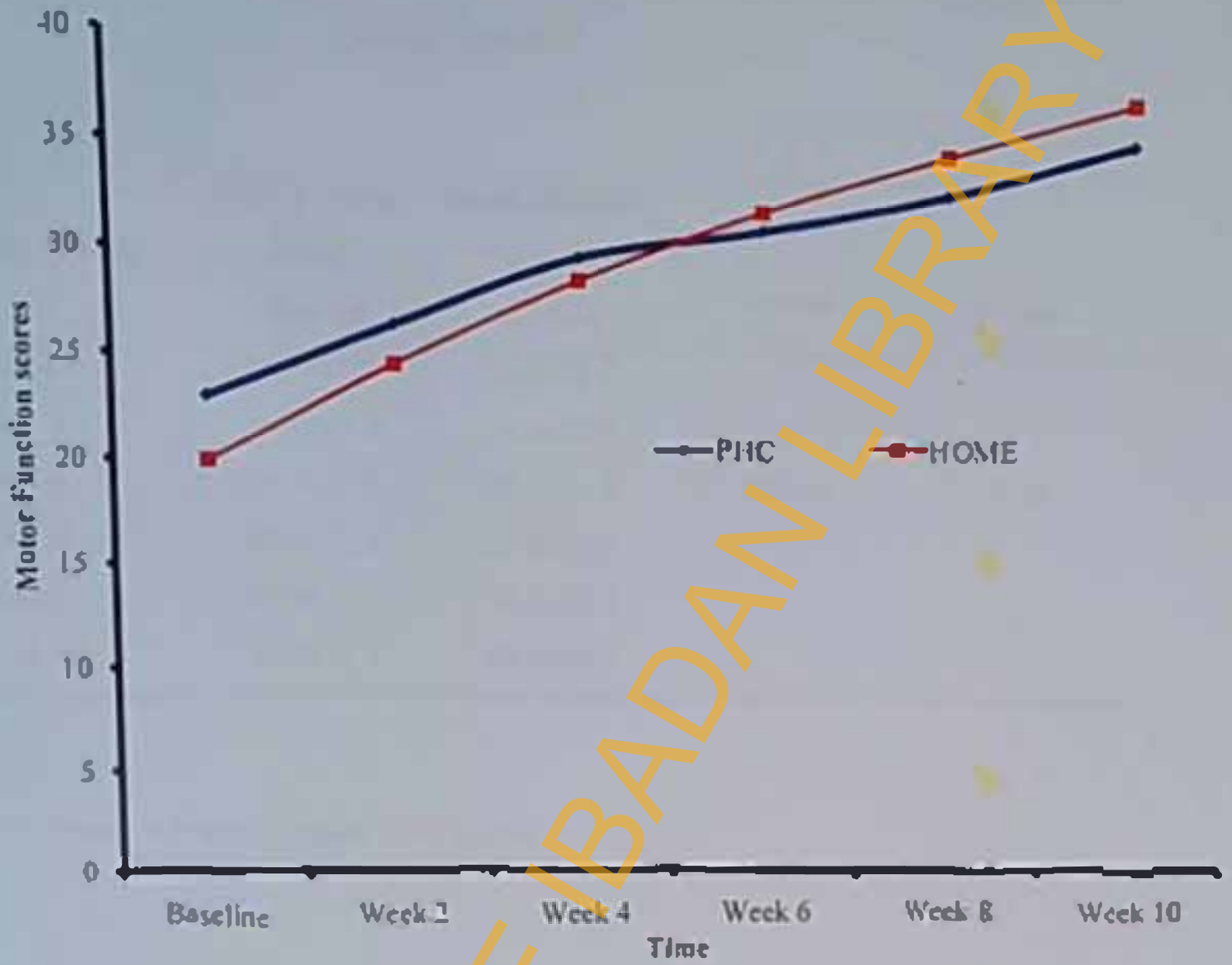
#### 4.1.4 Changes in Postural Balance Scores (SEPASS) of Participants over 10 weeks

There was a statistically significant increase in the postural balance scores of participant in the PHC group from  $8.6 \pm 5.0$  at baseline to  $12.3 \pm 3.2$  at week 10 (Table 5). There was a similar statistically significant increase ( $p < 0.05$ ) in the postural balance scores in Home group at from  $7.1 \pm 5.6$  at baseline to  $12.3 \pm 3.3$  at week 10 (Table 6). The increases demonstrated a time – trend effect, that is, it continued over the study period (Figure 3).

There was no statistically significant difference in the mean scores for postural balance over time (week 0 to 10) between the PHC and Home groups ( $F = 370.82$ ;  $p = 0.65$ ). The PHC had a clinical but not statistically significantly higher score at baseline ( $22 \pm 15.2$ ) than the Home group ( $19.9 \pm 16.4$ ), both groups had comparable scores throughout the study period (Table 7).

#### 4.1.5 Changes in Community Reintegration Scores (RNL1) of Participants over 10 weeks

The PHC group demonstrated significant increase in the level of community reintegration from  $30.1 \pm 22.9$  at baseline to  $58.7 \pm 25.4$  at week 10 (Table 8). This increase showed a statistically significant positive difference in the level of reintegration of the participants ( $\chi^2 = 122.89$ ;  $p = 0.01$ ). The community reintegration scores of participants in the Home group increased from  $28.4 \pm 26.1$  at baseline to  $53.9 \pm 28.7$  at week 10 (Table 9). The observed increase was also statistically significant ( $\chi^2 = 78.42$ ;  $p = 0.01$ ). The increases in the two groups did not follow a time – trend particularly from week 6 (Figure 4). Between-group comparison of the mean scores for RNL1 showed no statistically significant difference ( $p = 0.90$ ) over the 10- week period between the PHC and Home groups (Table 10).



**Key:**

PHC = Primary Health Care

Figure 4.2. Trend of motor function scores in the Primary Health Care and Home groups over 10 weeks

Table 4.4. Comparison of motor function scores of participants in the Primary Health Care and Home groups from baseline to week 10 using the General Linear Model (N = 52)

Time Frame	PHC Group:	Home Group:	f-value	p-value
	n = 25 $\bar{x} \pm S.D$	n = 27 $\bar{x} \pm S.D$		
Baseline	22.9 ± 15.2	19.9 ± 16.4		
Week 2	26.3 ± 13.9	24.4 ± 14.5		
Week 4	29.5 ± 13.2	28.4 ± 13.0	280.31	0.94
Week 6	30.8 ± 12.8	31.6 ± 11.7		
Week 8	32.4 ± 12.7	31.2 ± 11.2		
Week 10	34.7 ± 11.7	36.6 ± 10.3		

**Key:**

PHC Group = Primary Health Care Group

TABLE 4.5. Comparison of the postural balance scores of participants in the Primary Health Care group from baseline to week 10 using Friedman's test (N = 25)

Time Frame	Mean scores	$\chi^2$	p-value
	$\bar{x} \pm S.D$		
Baseline	8.6 ± 5.0	89.58	0.01*
Week 2	9.1 ± 4.4		
Week 4	10.1 ± 3.7		
Week 6	11.1 ± 3.6		
Week 8	11.7 ± 3.2		
Week 10	12.3 ± 3.2		

\*Significant at  $p < 0.05$

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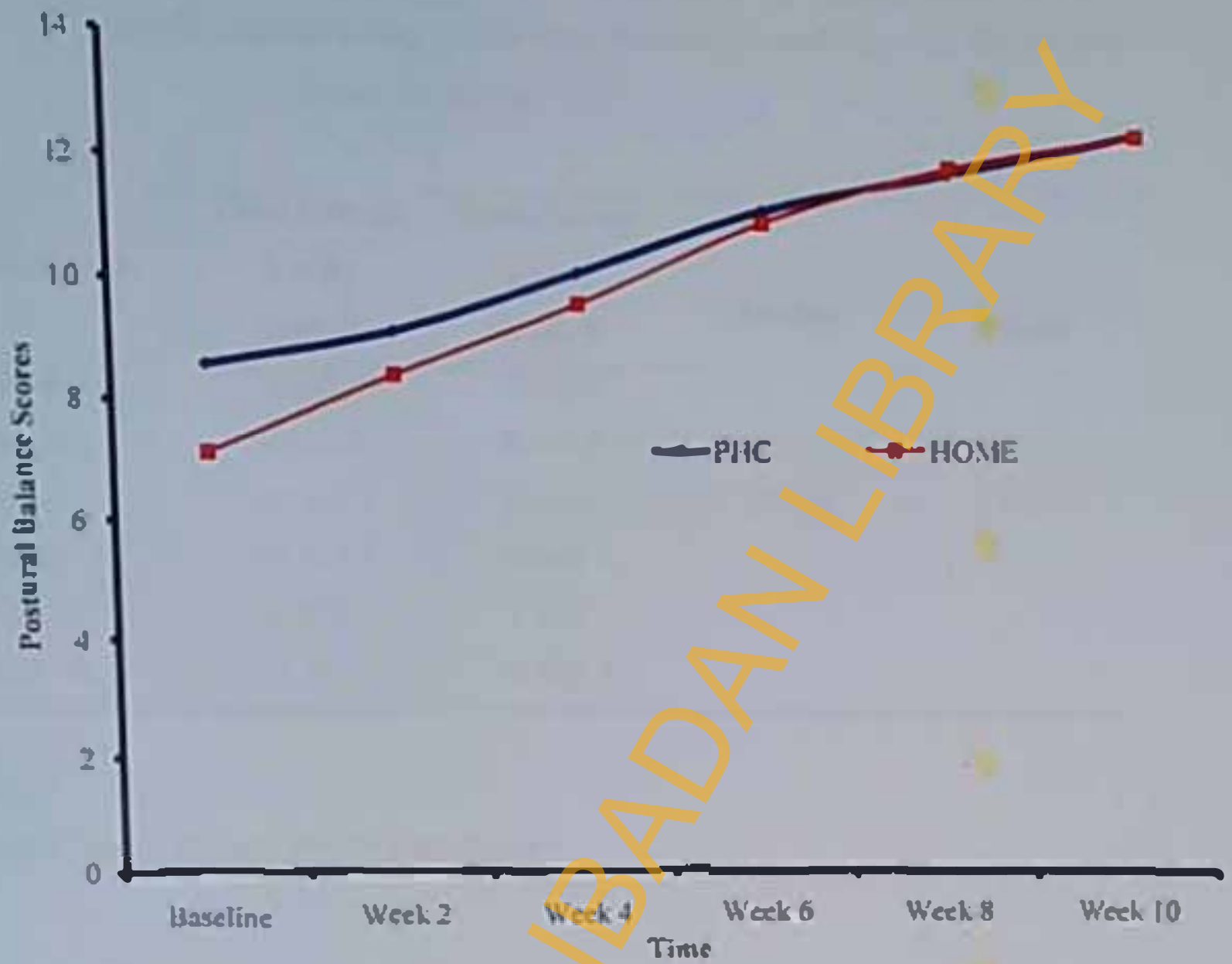
Table 4.6. Comparison of the postural balance scores of participants in the Home group from baseline to week 10 using Friedman's test (N = 27)

Time Frame	Mean scores	$\chi^2$	p-value
	$\bar{x} \pm S.D$		
Baseline	7.1 ± 5.6	99.93	0.01*
Week 2	8.4 ± 4.9		
Week 4	9.6 ± 4.2		
Week 6	10.9 ± 3.6		
Week 8	11.8 ± 3.5		
Week 10	12.3 ± 3.3		

\*Significant at  $p < 0.05$

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**Key:**

PHC = Primary Health Care

Figure 4.3. Trend of postural balance scores in the Primary Health Care and Home groups over 10 weeks

**Table 4.7. Comparison of the postural balance scores of participants in the Primary Health Care and Home groups from baseline to week 10 using the General Linear Model (N = 52)**

Time Frame	PHC Group:	Home Group:	F-value	p-value
	n = 25 $\bar{x} \pm S.D$	n = 27 $\bar{x} \pm S.D$		
Baseline	8.6 ± 5.0	7.1 ± 5.6		
Week 2	9.1 ± 4.4	8.4 ± 4.9		
Week 4	10.1 ± 3.7	9.6 ± 4.2	370.82	0.65
Week 6	11.1 ± 3.6	10.9 ± 3.6		
Week 8	11.7 ± 3.2	11.8 ± 3.5		
Week 10	12.3 ± 3.2	12.3 ± 3.3		

**Key:**

PHC Group = Primary Health Care Group

**Table 4.8. Comparison of community reintegration scores of participants in the Primary Health Care group from baseline to week 10 using Friedman's test (N =25)**

Time Frame	Mean scores	$\chi^2$	p-value
	$\bar{x} \pm S.D$		
Baseline	30.1±22.9		
Week 2	36.5±23.8		
Week 4	45.8±24.4	122.89	0.01*
Week 6	52.8±24.6		
Week 8	57.6±25.1		
Week 10	58.7±25.1		

\*Significant at  $p < 0.05$

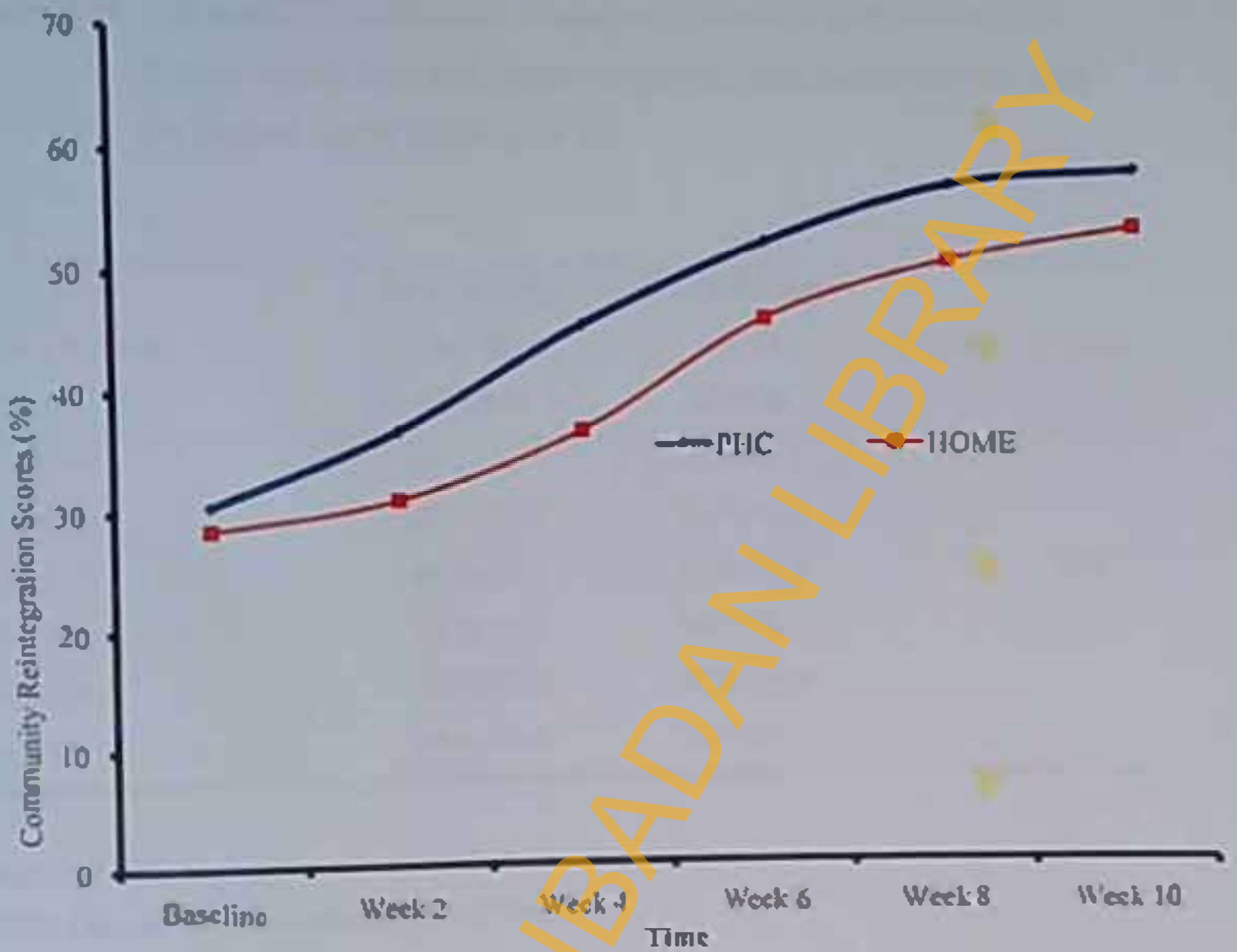
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**Table 4.9. Comparison of community reintegration scores of participants in the Home group from baseline to week 10 using Friedman's test (N = 27)**

Time Frame	Mean scores	$\chi^2$	p-value
	$\bar{x} \pm S.D$		
Baseline	28.4 ± 26.1	78.42	0.01*
Week 2	31.0 ± 26.4		
Week 4	36.8 ± 25.9		
Week 6	46.3 ± 28.0		
Week 8	51.2 ± 28.6		
Week 10	53.9 ± 28.7		

\*Significant at  $p < 0.05$

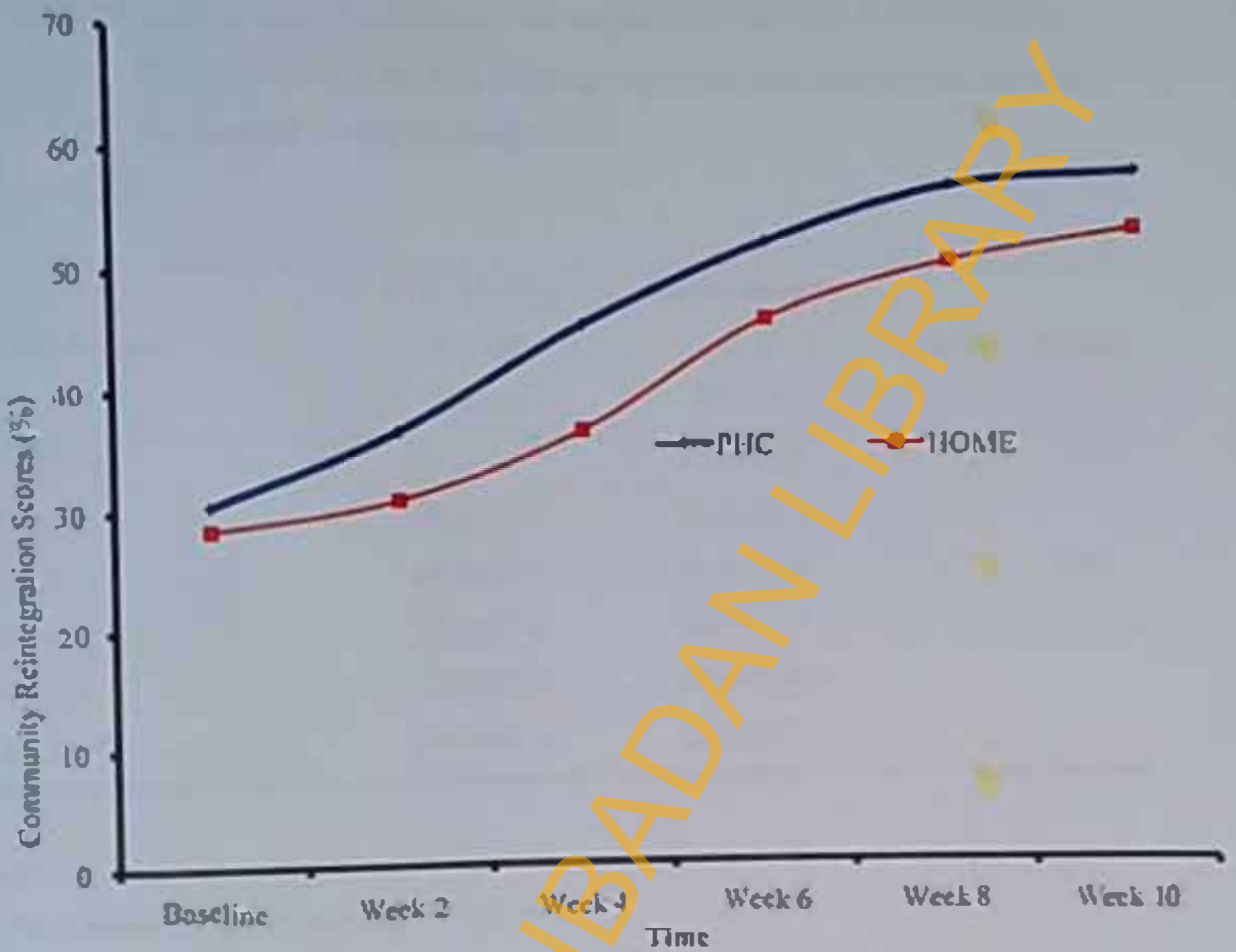
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Key:

PHC = Primary Health Care

Figure 4.4. Trend of community reintegration scores of participants in the Primary Health Care and Home groups



**Key:**

PHC = Primary Health Care

Figure 4.4. Trend of community reintegration scores of participants in the Primary Health Care and Home groups

**Table 4.10. Comparison of community reintegration scores of participants in the Primary Health Care and Home groups from baseline to week 10 using the General Linear Model (N = 52)**

Time Frame	PHC Group:	Home Group:	t-value	p-value
	n = 25 $\bar{x} \pm S.D$	n = 27 $\bar{x} \pm S.D$		
Baseline	30.1 ± 22.9	28.4 ± 26.1		
Week 2	36.5 ± 23.8	31.0 ± 26.4		
Week 4	45.8 ± 24.4	36.8 ± 25.9	3.92	0.90
Week 6	52.8 ± 24.6	46.3 ± 28.0		
Week 8	57.6 ± 25.1	51.2 ± 28.6		
Week 10	58.7 ± 25.4	53.9 ± 28.7		

**Key:**

PHC Group = Primary Health Care Group

#### 4.1.6 Changes in Quality of Life (HRQLISP) Scores of over 10 weeks

The physical, emotional, spirit and spiritual interaction domains scores on the HRQLISP in the PHC group statistically increased from  $63.4 \pm 15.1$ ,  $61.2 \pm 12.2$ ,  $72.1 \pm 4.9$  and  $77.6 \pm 9.3$  respectively at baseline to  $75.6 \pm 14.9$ ,  $72.6 \pm 17.4$ ,  $77.1 \pm 4.4$  and  $84.9 \pm 6.1$  respectively at week 10 (Table 11). The Home group also obtained statistically significantly higher scores in the physical ( $69.6 \pm 17.4$ ) and emotional ( $77.8 \pm 10.5$ ) domains at week 10 compared with the physical ( $59.7 \pm 17.3$ ) and emotional ( $66.7 \pm 11.5$ ) domain scores at baseline on the HRQLISP (Table 12). The overall quality of life in each of the two groups were significantly increased ( $p = 0.01$ ) from base line to week 10.

The PHC group showed a statistically significant increase in the spiritual interaction domain score ( $84.9 \pm 6.1$ ) on the HRQLISP compared with the Home group ( $76.7 \pm 8.9$ ) while the Home group had a statistically significant increase in the socio-social domain ( $68.7 \pm 13.3$ ) compared with the PHC group ( $62.3 \pm 6.0$ ). The scores in other domains were comparable in both groups and the overall HRQLISP scores between the two groups were not statistically different (Tables 13 and 14).

#### 4.1.7 Changes in Asymmetry Ratio and Walking Speed over 10 weeks

The weight distribution (asymmetry ratio) of participants in the two groups was significantly higher post - intervention ( $p < 0.05$ ). The walking speed in the PHC group significantly increased from  $0.30 \pm 0.20$  m/s at baseline to  $0.60 \pm 0.40$  m/s at week 10. There was a similar statistically significant increase in the walking speed of participants in the Home group from  $0.30 \pm 0.10$  m/s at baseline to  $0.50 \pm 0.40$  m/s at week 10 (Table 15). However, the mean asymmetry ratio and walking speed between the two groups were not statistically different (Table 16).



Table 4.11. Comparison of quality of life scores of participants in the Primary Health Care group at baseline and week 10 (N = 25)

Domains	Baseline $\bar{x} \pm S.D$	Week 10 $\bar{x} \pm S.D$	t-value	p-value
Physical	63.4 $\pm$ 15.1	75.6 $\pm$ 14.9	7.45	0.01*
Emotional	64.2 $\pm$ 12.2	72.6 $\pm$ 17.4	2.41	0.02*
Intellectual	78.5 $\pm$ 12.7	81.6 $\pm$ 12.8	1.80	0.08
Soul	72.3 $\pm$ 6.9	72.1 $\pm$ 7.3	0.27	0.78
Spirit	72.1 $\pm$ 4.9	77.1 $\pm$ 4.4	3.74	0.01*
Eco-social	64.7 $\pm$ 6.0	62.3 $\pm$ 6.0	1.85	0.07
Spirit. Interaction	77.6 $\pm$ 9.3	84.9 $\pm$ 6.1	5.16	0.01*
Total HRQLISP	70.4 $\pm$ 4.9	75.2 $\pm$ 5.4	5.62	0.01*

\*Significant at p < 0.05

**Key:**

HRQLISP = Health-Related Quality of Life in Stroke Patients

Table 4.12. Comparison of quality of life scores of participants in the Home group at baseline and week 10 (N = 27)

Domains	Baseline $\bar{x} \pm S.D$	Week 10 $\bar{x} \pm S.D$	t-value	p-value
Physical	59.7 $\pm$ 17.39	69.63 $\pm$ 17.4	3.44	0.01*
Emotional	66.7 $\pm$ 11.5	77.8 $\pm$ 10.5	4.53	0.01*
Intellectual	78.2 $\pm$ 13.8	82.6 $\pm$ 13.7	1.77	0.08
Soul	71.8 $\pm$ 5.1	73.6 $\pm$ 7.8	1.02	0.31
Spirit	72.5 $\pm$ 5.4	73.3 $\pm$ 6.4	1.75	0.09
Eco-social	64.9 $\pm$ 5.6	68.7 $\pm$ 13.3	1.78	0.08
Spirit. Interaction	74.2 $\pm$ 8.3	76.7 $\pm$ 8.9	1.03	0.31
Total HRQLISP	69.7 $\pm$ 5.8	74.8 $\pm$ 5.9	5.00	0.01*

\*Significant at  $p < 0.05$

**Key:**

HRQLISP = Health-Related Quality of Life in Stroke Patients

Table 4.13. Comparison of quality of life of participants in the Primary Health Care and Home groups at baseline (N = 52)

Domains	PHC Group n = 25 $\bar{x} \pm S.D$	Home Group n = 27 $\bar{x} \pm S.D$	t-value	p-value
Physical	63.4 ± 15.1	59.7 ± 17.3	0.79	0.43
Emotional	64.2 ± 12.2	66.7 ± 11.5	0.74	0.45
Intellectual	78.5 ± 12.7	78.2 ± 13.8	0.07	0.93
Soul	72.3 ± 6.9	71.8 ± 5.4	0.29	0.76
Spirit	72.1 ± 4.9	72.5 ± 5.4	0.27	0.78
Eco-social	64.7 ± 6.0	64.9 ± 5.6	0.09	0.92
Spirit. Interaction	77.6 ± 9.3	74.2 ± 8.3	1.37	0.17
Total HRQLISP	70.4 ± 1.9	69.7 ± 5.8	0.45	0.65

**Key:**

HRQLISP = Health-Related Quality of Life in Stroke Patients

**Table 4.14. Comparison of quality of life of participants in the Primary Health Care and Home groups at week 10 (N = 52)**

Domains	PHC Group	Home Group	t-value	p-value
	n = 25 $\bar{x} \pm S.D$	n = 27 $\bar{x} \pm S.D$		
Physical	75.6 $\pm$ 14.9	69.6 $\pm$ 17.4	1.31	0.19
Emotional	72.6 $\pm$ 17.4	77.8 $\pm$ 10.5	1.31	0.19
Intellectual	81.6 $\pm$ 12.8	82.6 $\pm$ 13.7	0.24	0.80
Soul	72.1 $\pm$ 7.3	73.6 $\pm$ 7.8	0.70	0.48
Spirit	77.1 $\pm$ 11.1	74.3 $\pm$ 6.4	1.81	0.07
Eco-social	62.3 $\pm$ 6.0	68.7 $\pm$ 13.3	2.20	0.03*
Spirit. Interaction	84.9 $\pm$ 6.1	76.7 $\pm$ 8.9	3.80	0.01*
Total HRQLISP	75.2 $\pm$ 5.4	74.8 $\pm$ 5.9	0.26	0.79

\* Significant at  $p < 0.05$

**Key:**

PHC Group = Primary Health Care Group

HRQLISP = Health-Related Quality of Life in Stroke Patients

**Table 4.15. Within-group comparison of asymmetry ratio and walking speed of the Primary Health Care and Home groups at baseline and week 10 (N = 52)**

Variable/Time	PHCG n = 25			Home Group n = 27		
	$\bar{x} \pm S.D$	t-value	p-value	$\bar{x} \pm S.D$	t-value	p-value
<b>Asymmetry ratio</b>						
Baseline	0.5±0.3	4.40	0.01*	0.3±0.4	5.20	0.01*
Week 10	0.7±0.3			0.7±0.3		
<b>Walking speed (metre/sec)</b>						
Baseline	0.3±0.2	2.25	0.01*	0.3±0.4	3.71	0.01*
Week 10	0.6±0.4			0.5±0.4		

\* Significant at  $p < 0.05$

**Key:**

PHCG = Primary Health Care Group

Table .1.16. Between-group comparison of asymmetry ratio and walking speed of the Primary Health Care and Home groups at baseline and week 10 (N = 52)

Variable/Time	PHCG	Home Group:	t-value	p-value
	n = 25 $\bar{x} \pm S.D$	n = 27 $\bar{x} \pm S.D$		
<b>Asymmetry ratio</b>				
Baseline	0.5±0.3	0.3±0.4	1.57	0.12
Week 10	0.7±0.3	0.7±0.3	0.11	0.91
<b>Walking speed (metre/sec)</b>				
Baseline	0.3±0.3	0.3±0.4	0.39	0.69
Week 10	0.6±0.4	0.5±0.4	0.31	0.73

**Key:**

PHCG = Primary Health Care Group

## 4.2 HYPOTHESES TESTING

### Sub-hypothesis 1

There would be no significant difference in the pre- and post 10 weeks motor function ability scores of chronic stroke survivors treated at a primary health centre using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 5$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby **FAILED TO BE ACCEPTED.**

### Sub-hypothesis 2

There would be no significant difference in the pre- and post 10 weeks postural balance scores of chronic stroke survivors treated at a primary health centre using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 5$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby **FAILED TO BE ACCEPTED.**

### Sub-hypothesis 3

There would be no significant difference in the pre- and post 10 weeks community reintegration scores of chronic stroke survivors treated at a primary health centre using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 5$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby **FAILED TO BE ACCEPTED.**

### Sub-hypothesis 4

There would be no significant difference in the pre- and post 10 weeks quality of life scores on the HRQLSP measure of chronic stroke survivors treated at a primary health centre using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 24$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby **FAILED TO BE ACCEPTED.**

### Sub-hypothesis 5

There would be no significant difference in the pre- and post 10 weeks asymmetry ratio of chronic stroke survivors treated at a primary health centre using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 24$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby FAILED TO BE ACCEPTED.

### Sub-hypothesis 6

There would be no significant difference in the pre- and post 10 weeks walking speed of chronic stroke survivors treated at a primary health centre using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 24$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby FAILED TO BE ACCEPTED.

### Sub-hypothesis 7

There would be no significant difference in the pre- and post 10 weeks motor function ability scores of chronic stroke survivors treated at their respective homes using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 5$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby FAILED TO BE ACCEPTED.

### Sub-hypothesis 8

There would be no significant difference in the pre- and post 10 weeks postural balance scores of chronic stroke survivors treated at their respective homes using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 5$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby FAILED TO BE ACCEPTED.



### Sub-hypothesis 9

There would be no significant difference in the pre- and post 10 weeks community reintegration scores of chronic stroke survivors treated at their respective homes using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 5$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby **FAILED TO BE ACCEPTED.**

### Sub-hypothesis 10

There would be no significant difference in the pre- and post 10 weeks quality of life scores on the HRQLISP measure of chronic stroke survivors treated at their respective homes using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 26$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby **FAILED TO BE ACCEPTED.**

### Sub-hypothesis 11

There would be no significant difference in the pre- and post 10 weeks asymmetry ratio of chronic stroke survivors treated at their respective homes using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 26$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby **FAILED TO BE ACCEPTED.**

### Sub-hypothesis 12

There would be no significant difference in the pre- and post 10 weeks walking speed of chronic stroke survivors treated at a primary health centre using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 26$

Observed p-value = 0.01

Since the observed p-value is less than the critical p-value, the hypothesis hereby **FAILED TO BE ACCEPTED.**

### Sub-hypothesis 13

There would be no significant difference between the pre- and post 10 weeks motor function ability scores of chronic stroke survivors treated at a primary health centre and counterparts treated in their respective homes using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 10$

Observed p-value = 0.91

Since the observed p-value is greater than the critical p-value, the hypothesis is hereby ACCEPTED.

### Sub-hypothesis 14

There would be no significant difference between the pre- and post 10 weeks postural balance scores of chronic stroke survivors treated at a primary health centre and their counterparts treated in their respective homes using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 10$

Observed p-value = 0.65

Since the observed p-value is greater than the critical p-value, the hypothesis is hereby ACCEPTED.

### Sub-hypothesis 15

There would be no significant difference between the pre- and post 10 weeks community reintegration scores of chronic stroke survivors treated at a primary health centre and their counterparts treated in their respective homes using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 10$

Observed p-value = 0.90

Since the observed p-value is greater than the critical p-value, the hypothesis is hereby ACCEPTED.

### Sub-hypothesis 16

There would be no significant difference between the pre- and post 10 weeks quality of life scores on the HRQLISP measure of chronic stroke survivors treated at a primary health centre and their counterparts treated in their respective homes using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 50$

Observed p-value = 0.79

Since the observed p-value is greater than the critical p-value, the hypothesis is hereby ACCEPTED.

#### Sub-hypothesis 17

There would be no significant difference between the pre- and post 10 weeks asymmetry ratio of chronic stroke survivors treated at a primary health centre and their counterparts treated in their respective homes using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 50$

Observed p-value = 0.69

Since the observed p-value is greater than the critical p-value, the hypothesis is hereby ACCEPTED.

#### Sub-hypothesis 18

There would be no significant difference between the pre- and post 10 weeks walking speed of chronic stroke survivors treated at a primary health centre and their counterparts treated in their respective homes using the newly developed PHCPP.

At  $P < 0.05$ ,  $df = 50$

Observed p-value = 0.73

Since the observed p-value is greater than the critical p-value, the hypothesis is hereby ACCEPTED.

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## 4.3 Discussion

### 4.3.1 Development of the Primary Health Care-based Physiotherapy Protocol

Many stroke survivors find it difficult to access physiotherapy which is an important component of stroke rehabilitation. This is due partly to the fact that in Nigeria, physiotherapy clinics are located in secondary and tertiary health care centres. These health centres are often urban-based and are becoming increasingly expensive because of the need to maintain the infrastructural facilities therein. For those who can access care at these levels, there is also the problem of congestion and increase patient-waiting time which are detrimental to treatment outcome.

Primary health care is the means to attaining an acceptable level of health for all (WHO, 1978). Primary health centres are located in a way to provide access to healthcare for all. For services to be continually available at such centres, 'appropriate technology' must be used. In Nigeria appropriate technology must limit if not eliminate the use of electricity which has always been epileptic. The developed PHCPP consists mainly of structured exercises and the only technologies needed are chairs, stools and stairs which are readily available in the community. It can be used by the physiotherapist as well as the patient. This is in line with the mandate of the WHO (1978).

### 4.3.2 Demographic and Clinical Characteristics of the Participants

The two groups of participants had comparable physical characteristics and clinical presentations except in the gender distribution. This was adjusted for using Bonferroni post-hoc analysis. Thus differences and changes observed in variables assessed in the two groups may not be attributed to the difference in gender distribution. Age is a non-modifiable risk factor for stroke (Russo et al, 2011). The mean ages of participants in the two groups were above 60 years. Over 80% of strokes occur in the elderly with mean age  $\geq 65$  years (Chen et al, 2010). The risk of stroke increases with increasing age and doubles with each successive decade above age 55. This may be because age is an important non-modifiable risk factor for stroke. Majority of the participants in the study had history of hypertension which is a major risk factor. Hypertension still remains the major modifiable risk factor for strokes (Bejot et al, 2007). The findings in this may also be because the study population is a black

community. It has been reported that the prevalence of hypertension is higher in the black race, a factor which may be race-related or inherited (Sacco et al. 2001).

#### 4.3.3 Changes in Motor Function Scores (MMAS) of Participants over 10 weeks

There was a significant improvement in motor function ability of participants within each of the two groups across the 10 weeks. This implies that the PHCPP was associated with improvement in motor function ability in stroke survivors. This observed trend in improved clinical indices may be due to the inclusion of task-oriented exercises in the protocol. Evidence has shown that task-oriented training is effective in stroke rehabilitation compared with training at impairment level (Rensik et al. 2009). The Home group showed a higher time-trend compared with the PHCC from 6 weeks to 10 weeks. This finding is comparable with the findings of Hiller and Inglis-Jassiem (2010) who found a significant improvement in function at 6 weeks in favour of HBR in a systematic review of 11 trials comparing functional benefits of HBR versus centre-based rehabilitation for community-dwelling people with stroke. Patients who receive rehabilitation in the home have also been noted to make better adjustments to residual disability (Anderson et al. 2000). This may be because the level of disability is more apparent in patients' own home environments and it is easier to tailor rehabilitation programme towards the expressed needs of patients in their homes. It may also be that patients are better able to develop adaptation strategies to compensate for the apparent impairments when at home than in other environments. It may be because being at home enabled patient to assume responsibility for and exert influence on their own rehabilitation (vonKoch et al. 2000).

No statistically significant difference was found in the mean motor function scores between the two study groups over the 10 weeks period. The absence of a significant difference between the two groups at any point in time over the period of assessment may be indicative of the fact that both venues were equally effective in terms of patient outcome. In a similar study by Lord et al (2008) to evaluate the feasibility of community-based physiotherapy in sub-acute stroke, they found no significant difference in activities pre- and post-intervention in the community and home groups.

This shows that community-based physiotherapy (PHC-based) is a practicable alternative to routine home physiotherapy (Lord et al, 2008).

#### 4.3.4 Changes in Postural Balance Scores (SF-PASS) of Participants over 10 weeks

A statistically significant improvement was observed in the postural balance within each of the two groups over the 10-week period. This may be due to the specificity of balance training in the stroke survivors using the domains of the Berg Balance Scales (BBS). The BBS has activities like standing unsupported, sitting unsupported, transfer activities, reaching out, stepping, standing and turning around which are carried out in normal day-to-day living by people. Studies have shown that the Berg Balance Scale can successfully be used to train balance in stroke survivors (Au-Yeung et al, 2003; Hamzat and Fashoyin, 2007). Balance training is known to be more effective when it is related to a task (Bayouk et al. 2006). The BBS used in this study employed a task-oriented approach of training balance and may account for the observed improvement in balance seen in the participants.

The lack of a significant difference between the two groups showed rehabilitation in a PHC using the PHCPP produced a similar effect on postural balance as rehabilitation in the home using the same protocol. Lord et al (2008) also found no significant difference in balance measured on the specific balance scale between the home and community groups in their study.

#### 4.3.5 Changes in Community Reintegration Scores (RNL) of Participants over 10 weeks

There was a statistically significant difference in the within – group scores on the RNL over the 10-week period. The community reintegration level of the participants improved more in the PHC group than in the Home group. This finding is in contrast with the findings of Lord et al (2008) and Markle-Reid et al (2011). Both studies found no significant difference in community reintegration between the community and home groups. It may be because the participants in the study of Markle-Reid et al (2011) were up to 1 year post-stroke and were already community-dwelling while the study period in the study of Lord et al (2008) was 7 weeks. This period may not have

been enough for there to be a significant difference in the community reintegration level of participants in their study.

The findings in this study may be related to the findings of Pang et al (2007) who suggested that improving balance function promote community reintegration. A significant improvement in balance function may translate to improvement in community reintegration. This may be because restoration of balance post-stroke help with the recovery of activities and improves participation. It may also be related to the significant improvement in the motor function ability of the participants. Functional status is one of the highly significant predictors of social integration after stroke (Baseman et al. 2010). Lack of difference in the between the two groups emphasise further the feasibility using of either treatment venues for stroke rehabilitation.

#### 1.3.6 Changes in Quality of Life (HRQLISP) Scores of Participants over 10 weeks

The PHCG and HG had comparable scores in all domains of the HRQLISP at baseline. However, the PHCG had a significantly higher score in the spirit and spiritual interaction domains compared with the HG at week 10. This agrees with the finding of greater improvement in quality of life measured on the SF-36 in the community group in the study of Markle-Reid et al (2011). This may be because they had opportunity for socialising with other patients with similar condition. This might have engendered in them a feeling of hope, social interaction and spirituality (Ilae et al. 2003). The Home group had a better score in the socio-social domain compared with the PHC group. This may be because participants in the Home group probably had more financial support and did not have to travel any distance to receive physiotherapy especially while participating in this study. In our environment, people who are home-bound on account of an incapacitating disease are often catered for through the extended family system. People sometime want to outdo one another in this show of care. This may account for the observed improvement in the Home group.

There was a significant difference in the baseline and week 10 scores of the physical and emotional domains on the HRQLISP in the PHC and in the Home groups. This

may be attributable to the improvement in functional ability. A positive association has been reported between health-related quality of life and motor function (Hamzai and Peters, 2009). According to Chau et al (2009), functional ability has the largest direct impact on participation restriction. Participation restriction affects quality of life. Inability or limitation in participating in activities considered important to patients can influence how such a patient perceives him/her self. Ability to carry out basic functions such as dressing which could have been impaired by stroke may impact on perceived self-worth. Physical functioning has also been identified as one of the drivers of health-related QoL (Mayo et al, 2008). The absence of a significant difference in HRQLISP in both study groups affirmed the fact that the PHC and patients' homes are comparable in terms of patients' outcomes.

#### 4.3.7 Changes in Asymmetry Ratio and Walking Speed of Participants over 10 weeks

There was a significant difference in the asymmetry ratio and walking speed of participants in both the PHC and Home groups over the 10-week period. Lord et al (2008) also reported a large gain in gait speed in both the community and home groups. Studies have shown the interdependency or relationship between asymmetry ratio and walking speed (Sorinola, 2002; Hamzai et al, 2006). A decrease in the degree of asymmetry, which is a reflection of improvement in postural balance function, translates to improvement in quality of gait (Hamzai et al, 2006). This finding may not be unconnected with the improvement in balance function recorded in this study. It may also be because of the inclusion of strengthening exercises in the PHCPP. Pang and Eng (2008) found a significant association between gain in paretic leg muscle strength and gain in walking capacity. Enhancement of paretic leg muscle strength was reported to be a significant determinant of improvement in walking capacity among chronic stroke survivors (Pang and Eng, 2008).

There was no significant difference in the between-groups comparison of asymmetry ratio and walking speed of participants in the PHC and Home groups. This suggests that the primary health centre and patients' homes are equally feasible venues for training and achieving improvement in asymmetry ratio and walking speed.



## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Summary

Stroke is as an acute disturbance of focal or global cerebral function with symptoms lasting more than 24 hours or resulting in death with no apparent cause other than vascular. There is generally a heavy reliance on hospital for rehabilitation of patients with stroke in most countries, including Nigeria. This traditional, institution-based approach is increasingly expensive, inaccessible and fraught with shortfalls in service provision. It has thus become imperative for clinicians and policy makers to develop and evaluate practical, yet effective alternative care environments for stroke rehabilitation within the community to enhance universal access. This study was proposed to develop a Primary Health Care-based Physiotherapy Protocol (PHCPP) which requires simple, easy-to-use equipment for stroke rehabilitation and to evaluate the effects of the PHCPP on selected indices of stroke recovery.

Introducing rehabilitation services at a local or community level removes or reduce to minimum, the obstacles associated with traditional institutional care. Rehabilitation may be offered in the actual home of the person as home-based rehabilitation. The effectiveness and relative advantages of home-based rehabilitation over hospital care have been shown in several studies. However, the exact timing and contents of such therapies are unclear. In recent years, the delivery of healthcare services using primary health care models has received much attention. Primary health care models are seen as effective strategies to improve clients' access to needed care and provide 'health for all'. Studies have demonstrated the feasibility and cost-saving role of physiotherapy in such models too.

Treatment approaches and modalities with proven efficacy in managing selected indices of stroke recovery were identified using the physiotherapy evidence database (PEDro). These established treatment approaches were synthesised to develop the

Primary Health Care-based Physiotherapy Protocol (PHCPP). The PHCPP was used as intervention in this quasi-experimental study (randomised controlled clinical trial) involving 52 consenting stroke survivors. The 52 participants were randomly assigned into either the Primary Health Care Group (PHCG) or Home Group (HG). Participants in the PHCG were treated at the primary health centre, Oniyarín, Ibadan while participants in the HG were treated in the individual patients' own homes twice weekly for 10 consecutive weeks. The demographic and clinical variables of the participants were recorded. Motor function, postural balance and community reintegration were measured fortnightly using the Modified Motor Assessment Scale, Short Form-postural Assessment Scale for Stroke and Reintegration to Normal Living Index respectively for the 10-week study period. Asymmetry ratio was calculated from weight distribution on both lower limbs, quality of life was measured using the HRQLISI and walking speed was recorded as a distance of 6-metre divided by time taken in seconds to walk the distance pre- and post- intervention. Data collected were summarized using descriptive statistics of mean and percentage and analysed using t-tests and general linear model for repeated measures at  $p = 0.05$ .

The results of the study showed a significant improvement in the motor function ability, postural balance, community reintegration, quality of life, asymmetry ratio and walking speed of participants in each of the two groups. No significant difference was found in the between-group analysis of the motor function ability, postural balance, community reintegration, quality of life, asymmetry ratio and walking speed of participants.

## 5.2 Conclusions

Based on the findings of this study, it was concluded that:

- (i) the Primary Health Care-based Physiotherapy Protocol (PHCPP) was associated with improvement in motor function ability, postural balance, community reintegration, quality of life, asymmetry ratio and walking speed among chronic stroke survivors.
- (ii) the PHCPP can be used for stroke rehabilitation at home and primary health centres and is therefore
- (iii) a useful and reliable protocol for stroke rehabilitation.

### 5.3 Recommendations

1. It is recommended that the Primary Health Care-based Physiotherapy Protocol (PHCPP) should be used by Physiotherapists as a structured intervention for improving motor function ability, postural balance, community reintegration, quality of life, asymmetry ratio and walking speed among community-dwelling stroke survivors.
2. It is recommended that primary health centres should be used as alternative venues to hospitals for stroke rehabilitation to enhance access to physiotherapy services.
3. Studies should be carried out to compare stroke rehabilitation in the primary, secondary and tertiary health care centres using the PHCPP.

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**APPENDIX A**  
**STROKE LEVITY SCALE (Owolabi and Platz, 2008)**

i	Best motor power in the dominant hand/upper limb	0 - Nil	1 - Flicker of movement	2 - Active motion when gravity is eliminated	3 - Active motion against gravity	4 - Active motion against moderate resistance	5 - Normal
ii	Best motor power in the weaker lower limb	0	1	2	3	4	5
iii	Speech disorder (aphasia)	Nil - 0	Present - 1				
iv	Mobility	1 - Bed-bound		2 - Chair-bound	3 - Walks with one helper	4 - Walks independently with aids (e.g. frame/tripod)	5 - Walks unaided

**MRC, Motor Research Council.**

The score in the lower limb is determined as the maximum MRC power grade across the hip or ankle joint (whichever is higher). This is tested recumbent with assessment of hip flexion and ankle dorsiflexion. The power in the distal arm is tested by asking the patient to extend the wrist whilst making a fist. Aphasia is present if the patient is unable to comprehend and obey commands during assessment of items (i) and (ii) or unable to name a key.

Stroke Levity Scale = i + ii + iii + iv = maximum MRC power grade in the dexterous hand + maximum MRS power in the affected lower limb + mobility score - 1 (if aphasia is present). Minimum = 0, maximum = 15.



APPENDIX B

MODIFIED MOTOR ASSESSMENT SCALE SCORING SHEET (Carr et al. 1985)

NAME: \_\_\_\_\_

DATE: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

	0	1	2	3	4	5	6
1. Supine to side lying							
2. Supine to sitting over side of bed							
3. Balanced sitting							
4. Sitting to standing							
5. Walking							
6. Upper arm function							
7. Hand movements							
8. Advance hand activities							

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## APPENDIX B

### SCORING THE MMAS

#### 1. Supine to Side Lying onto Intact Side

1. Pulls himself into side lying (starting position must be supine lying, knees extended). Patient pulls himself into side lying with intact arm, moves affected leg with intact leg.
2. Moves leg across actively and lower half of the body follows (starting position as above. Arm is left behind).
3. Arm is lifted across body with other arm. Legs are moved actively and body follows in a block (starting position as above).
4. Moves arm across body actively and the rest of the body follows in a block (starting position as above).
5. Move arm and leg and rolls to side but overbalances (starting position as above). Shoulder protracts and arm flexes forward.
6. Rolls to side in 3 seconds (starting position as above). Must not use hands.

#### 2. Supine to Sitting over Side of Bed

1. Side lying, lifts head sideways but cannot sit up (Patient assisted to side lying).
2. Side lying to sitting over side of bed (Therapist assists patient with movement). Patient controls head position throughout.
3. Side lying to sitting over side of bed (Therapist gives stand-by help). Legs over side of bed.
4. Side lying over to sitting over side of bed (with no stand-by help).
5. Supine to sitting over side of bed (with no stand-by help).
6. Supine to sitting over side of bed within 10 sec (with no stand-by help).

#### 3. Balanced Sitting

1. Sits only with support (Therapist should assist patient into sitting).
2. Sits unsupported for 10 sec (without holding on, knees and feet together, feet can be supported on floor).
3. Sits unsupported with weight well forward and evenly distributed (weight should be well forward at the hips, head and thoracic spine extended, weight evenly distributed on both sides).

4. Sits unsupported turns head and trunk to look behind (feet supported and together on floor, do not allow legs to abduct or feet to move). Have hands resting on thighs (do not allow hands to move onto plinth).

5. Sits unsupported, reaches forward to touch floor and returns to starting position (feet supported on the floor). Support affected arm if necessary. Hand must touch floor at least 10 cm in front of feet.

6. Sits on stool unsupported, reaches sideways to touch floor and returns to starting position (feet supported on the floor). Support affected arm if necessary. Patient must reach sideways not forward.

#### 4 Sitting to Standing

1. Gets to standing with help from therapist (any method).

2. Gets to standing with stand-by help (weight unevenly distributed, used hands for support).

3. Gets to standing (do not allow uneven weight distribution or help from hands).

4. Gets to standing and stands for 5 sec with hips and knees extended (do not allow uneven weight distribution).

5. Sitting to standing to sitting with stand-by help. Do not allow uneven weight distribution (full extension of hips and knees).

6. Sitting to standing to sitting with no stand-by help three times in 10 sec (do not allow uneven weight distribution).

#### 5 Walking

1. Stands on affected leg and steps forward with other leg. Weight-bearing hip must be extended (Therapist may give stand-by help).

2. Walks with stand-by help from one person.

3. Walks 3m (10ft) with no aid in 15 sec.

4. Walks 5m (16ft) with no aid in 15 sec.

5. Walks 10m (33ft) with no aid, turns around, picks up a small sandbag from floor and walks back in 25 sec (may use either hand).

6. Walks up and down four steps with or without an aid but without holding on to rail three times in 35 sec.

#### 6. Upper Arm Function

1. Lying, supports shoulder girdle with arm in elevation (therapist places arm in position and supports it with elbow in extension).

2. Lying, holds extended arm in elevation for 2 sec (therapist should place arm in position and patient must maintain position with some external rotation).
3. Flexion and extension of elbow to take palm to forehead with arm as in 2 (therapist may assist supination of forearm).
4. Sitting, holds extended arm in forward flexion at  $90^\circ$  to body for 2 sec (therapist should place arm in position with some external rotation and elbow extension. Do not allow excessive shoulder elevation).
5. Sitting, patient lifts arm as in above position, holds it there for 10 sec and then lowers it (patient must maintain position with some external rotation. Do not allow pronation).
6. Standing, hand against wall, maintains arm position while turning body towards wall (arm abducted to  $90^\circ$  with palm flat against the wall).

## 7 Hand Movements

1. Sitting, extension of wrist (therapist should have patient sitting at a table with forearm resting on the table. Therapist places cylindrical object in palm of patient's hand. Patient is asked to lift object off the table by extending the wrist. Do not allow elbow flexion).
2. Sitting, radial deviation of wrist (therapist should place forearm in mid-pronation / supination, i.e. resting on ulnar side, thumb in line with forearm and wrist in extension, fingers around a cylindrical object. Patient is asked to lift hand off table. Do not allow elbow flexion or pronation).
3. Sitting, elbow into side, pronation and supination (elbow unsupported and at right angle, three-quarters range is acceptable).
4. Reaches forward, picks up a large ball of 1.1cm (5in) diameter with both hands and puts it down (ball should be on table so far in front of patient that he has to extend arms fully to reach it, shoulder must be protracted, elbow extended, wrist neutral or extended. Palm should be kept in contact with the ball).
5. Pick up polystyrene cup from table and put it on table across other side of body (do not allow alteration in shape of cup).
6. Continuous opposition of thumb and each finger more than 14 times in 10 sec (each finger in turn taps the thumb, starting with index finger. Do not allow thumb to slide from one finger to the other or to go backwards).

## 8 Advanced Hand Activities

1. Picking up the tip of a pen and putting it down again (patient stretches arm forward, picks up pen tip and drops it on table close to body).
2. Picking up one jellybean from a cup and placing it in another cup (teacup contains eight jellybeans. Both cups must be at arm's length. Left hand takes jellybean from cup on the right and drops it in cup on the left).
3. Drawing horizontal lines to stop at a vertical line 10 times in 20 sec (at least five lines must touch and stop at the vertical line).
4. Holding a pencil, making rapid consecutive dots on a sheet of paper (patient must do at least 3 dots a sec for 5 sec; patient picks pencil up and positions it without assistance. Patient must hold pencil as for writing. Patient must make a dot not a stroke).
5. Taking a dessert spoon of liquid to the mouth (do not allow head to lower towards spoon. Do not allow liquid to spill).
6. Holding a comb and combing hair at the back of head.

## APPENDIX C

### SHORT FORM POSTURAL ASSESSMENT SCALE FOR STROKE

(Chien et al, 2007)

ITEM	SCORING CRITERIA
1. Sitting on the edge of the table to supine 2. Supine to sitting up on the edge of the table 3. Sitting to standing up 4. Standing up to sitting down	0 = cannot perform the activity 1.5 = can perform the activity with help 3 = can perform the activity without help
5. Standing on non-paretic (no other constraints)	0 = cannot stand on non-paretic leg for a few seconds 1.5 = can stand on non-paretic leg for a few seconds (but less than 10 seconds) 3 = can stand on non-paretic leg for more than 10 seconds

Note: Item 1 and 2 are to be performed with a 50-cm high examination table;

Item 3 is to be performed without any support; no other constraints.

**APPENDIX D**  
**REINTEGRATION TO NORMAL LIVING INDEX**  
 (Wood-Dauphinee et al, 1988)

1. I move around my living quarters as I feel necessary.
2. I move around my community as I feel necessary.
3. I am able to take trips out of town as I feel are necessary.
4. I am comfortable with how my self-care needs (dressing, feeding, toileting, bathing) are met.
5. I spend most of my days in work activity that is necessary or important to me.
6. I am able to participate in recreational activities (hobbies, crafts, sports, reading, television, games, computers, etc.) as I want.
7. I participate in social activities with family, friends and/or business acquaintances as is necessary or desirable to me.
8. I assume a role in my family which meets my needs and those of other family members.
9. In general, I am comfortable with my personal relationships.
10. In general, I am comfortable with myself when I am in the company of others.
11. I feel that I can deal with life events as they happen.

Response	Score
No reintegration	0
Moderate reintegration	5
Complete reintegration	10

Total score = SUM (points for all 11 items)

Adjusted score =  $(\text{total score}) / 10 \cdot 100$

Minimum adjusted score = 0

Maximum adjusted score = 100

APPENDIX E

THE HEALTH RELATED QUALITY OF LIFE IN STROKE PATIENTS (HRQOLISP) QUESTIONNAIRE (Owolabi and Ogunniyi, 2009).

Today's Date

BIODATA

I.D. NUMBER

□□□

Please respond to the following questions by filling in the space provided or circling the correct response. The answer you give shall be regarded as anonymous and kept in strict confidence.

What is your gender?

1 Male

2 Female

What is your date of birth (if known)?

Day □

Month □

Year □

Age (or approximate age): \_\_\_\_\_

What is the highest formal education you have received?

None □

Primary □

Secondary □

Tertiary □

Others (specify) □

What is your occupation? : \_\_\_\_\_

What is your handedness?

Right □

Left □

What is your average income in naira month?

1. 0-10,000 2. 10,001 -25,000 3. 25,001-50,000 every

4. 50,001- 100,000 5. 100,001-150,000 6. > 150,000

What is your marital status?

1. Single 2. Separated 3. Married 4. Divorced  
5. Living as married 6. Widowed 7. Remarried

Number of husband/wives: \_\_\_\_\_

How many children do you have?

1. 0 2. 1 or 2 3. 3 or 4 4. 5 or 6 5. 7 and above

What is your tribe/region?

1. Yoruba 2. Hausa 3. Igbo 4. Others (specify) \_\_\_\_\_

What is your religion/denomination?

1. Christianity (specify denomination if any) \_\_\_\_\_  
2. Islam (specify denomination if any) \_\_\_\_\_  
3. Traditional (specify denomination if any) \_\_\_\_\_  
4. None  
5. Others (Please specify) \_\_\_\_\_



# STROKE TYPE, DURATION, FREQUENCY

Are you on admission now?

YES

NO

When did you (first) develop stroke?

\_\_\_\_\_

How many times have you had stroke?

\_\_\_\_\_

Did you have any of the following (To be filled by the investigator/interviewer)

Loss of consciousness?

YES

NO

Headache?

YES

NO

Vomiting?

YES

NO

T.I.A?

YES

NO

Gradual onset of symptoms?

YES

NO

Activity at onset?

YES

NO

Bloody C.S.F?

YES

NO

High Blood Pressure?

Nil/mild

moderate/severe

BP < 160/100

≥ 160/100mmHg

Which side of the body is affected? \_\_\_\_\_

Risk factors identified for stroke (including smoking/alcohol)? \_\_\_\_\_

C.T. scan/M.R.I report stroke type, extent and site \_\_\_\_\_

Co-morbid factors identified \_\_\_\_\_

**PLEASE REPORTS THE NEXT SECTION AS INTACT OR IMPAIRED**

Orientation (in time, place, person) \_\_\_\_\_ Memory (3-item registration and recall, past life events) \_\_\_\_\_ Calculation (serial subtraction of 3 from 20) \_\_\_\_\_ Abstraction (interpretation of proverb) \_\_\_\_\_ Judgement \_\_\_\_\_

# INSTRUCTIONS

This assessment asks about how you perceive your current state of health, quality of life or other areas of your life. Please answer all the questions honestly. If you are unsure about what response to give to a question, please choose the nearest most appropriate response.

Please keep in mind your standards, hopes, pleasures and concerns. Think about your life in the last two weeks. You should circle the number that best fits your response.

1.1.1: Physical Domain (i-iii) to be filled by the investigator

Best motor power in the dexterous hand/upper limb	0 nil	1 flicker	2 gravity eliminated	3 against gravity	4 against resistance	5 normal
Best motor power in the affected upper limb	0	1	2	3	4	5
Speech deficit (aphasia)	nil 0		Present 1			
Mobility	Bed bound 1	Chair bound 2	Walks with helpers 3	Walks with aids (frame/walker) 4	Walks unaided 5	
	Not at all 1	A little 2	A moderate amount 3	Very much 4	Extremely 5	
To what extent do you have difficulties gripping objects, turning door-knob, using a key, writing, opening jar/can, carrying heavy object?	0	1	2	3	4	
To what extent do you have difficulties controlling your bladder/bowels?	0	1	2	3	4	
To what extent do you have difficulties walking without losing your balance?	0	1	2	3	4	
To what extent do you have difficulties moving objects off to one side/reaching for objects because of poor eyesight?	0	1	2	3	4	
To what extent do you think physical weakness/condition prevent you from doing what you need to?	0	1	2	3	4	
How much do you need any medical assistance (drugs or aids) now or hospital admission to function in your daily life?	0	1	2	3	4	
To what extent has your life been affected, etc.?	0		2	3	4	

	Very dissatisfied	1 <sup>2</sup> dissatisfied	Neither Satisfied Nor dissatisfied	Satisfied	Very satisfied
ix) How satisfied are you with your capacity for work?	1	2	3	4	5
x) How satisfied are you with your sex life?	1	2	3	4	5
xi) How important to you are the aspects of your life covered in question iv-xiv in this section?	Not at all 1	A little 2	Moderately 3	Very much 4	Extremely 5

EMOTION/PSYCHOLOGICAL DOMAIN	Not at all ever	A Little Seldom	Moderately/ Quite often	Mainly/ Very often	Completely/ Always
	1	2	3	4	5
How often do you have negative feelings such as blue mood, anger, despair, anxiety, depression, fear?	0	1	2	3	4
Do you have enough energy for everyday life?	1	2	3	4	5
To what extent are you able to accept your bodily appearance?	1	2	3	4	5
To what extent do you enjoy your work?	1	2	3	4	5
How often do you laugh?	1	2	3	4	5
To what extent do you enjoy recreation/pastimes/leisure time/relaxation?	1	2	3	4	5
How safe do you feel in your daily life?	1	2	3	4	5
To what extent have you ever felt death to be better than your present condition?	0	1	2	3	4
To what extent have you ever felt like ending your life?	0	1	2	3	4
	Very dissatisfied	dissatisfied	Neither Satisfied Nor dissatisfied	Satisfied	Very satisfied
	1	2	3	4	5
	1	2	3	4	5
How satisfied are you with your sleep (duration)	1	2	3	4	5

	and quality)?					
10	How satisfied are you with your feeling?	1	2	3	4	5
11	How important to you are the aspects of your life covered in question 1-11 in this section?	Not at all	A little	Moderately	Very much	Extremely
		1	2	3	4	5

12	INTELLECTUAL/COGNITIVE DOMAIN	Not at all	A little	Moderately	Very much/ mostly	Extremely/ completely
		1	2	3	4	5
	How well are you able to concentrate?	1	2	3	4	5
	To what extent is your memory impaired?	0	1	2	3	4
	To what extent are you able to learn new things?	1	2	3	4	5
	To what extent do you understand your disease process?	1	2	3	4	5
	To what extent are you able to think out logical solutions to (your) problems and take decisions?	1	2	3	4	5
	To what extent are you able to relax your mind?	1	2	3	4	5
	How available to you is the information that you need for your day-to-day life?	1	2	3	4	5
	To what extent are you able to communicate?	1	2	3	4	5
		Very dissatisfied	Dissatisfied	Neither Satisfied Nor dissatisfied	Satisfied	Very satisfied
		1	2	3	4	5
	How satisfied are you with your memory and ability to concentrate?	1	2	3	4	5
	How satisfied are you with your ability to communicate?	1	2	3	4	5
	How satisfied are you with your ability to think and learn?	1	2	3	4	5
	How important to you are the aspects of your life covered in question 1-11 in this section?	Not at all	A little	Moderately	Very much	Extremely
		1	2	3	4	5

12.1	SOUL DOMAIN	Not at all	A little	moderate	Very much/ mostly	Extremely/ completely
		1	2	3	4	5
	How much do you value yourself?	1	2	3	4	5
	How much confidence do you have in yourself?	1	2	3	4	5
	How much confidence do you have in your God?	1	2	3	4	5
	How creative are you?	1	2	3	4	5
	To what extent are you independent and individualistic in reasoning and taking decisions?	1	2	3	4	5
	To what extent do you believe you have a purpose for living?	1	2	3	4	5
	To what extent are you interested in fulfilling your purpose for living?	1	2	3	4	5
	To what extent do you accept/believe in destiny/predetermination?	1	2	3	4	5
	To what extent do you believe in free will?	1	2	3	4	5
	To what extent do you think your present condition has prevented you from fulfilling your purpose of life?	0'	1'	2'	3'	4'
	To what extent do you think your present condition has assisted you in fulfilling your purpose of life?	0'	1'	2'	3'	4'
	To what extent are you intuitive/inspired/ingenuous?	1	2	3	4	5
	To what extent do you rely on God to solve your problems?	1	2	3	4	5
	To what extent do you rely on yourself to solve your problems?	1	2	3	4	5
	To what extent do you believe the devil is responsible for your present situation?	0'	1'	2'	3'	4'
	To what extent do you or other people responsible for your situation more than God?	0'	1'	2'	3'	4'
	To what extent do you believe in afterlife?	1	2	3	4	5
	To what extent do you believe in God?	1	2	3	4	5
	To what extent do you practice your religion/faith?	1	2	3	4	5
	To what extent do you accept your present state?	1	2	3	4	5
	How satisfied is your wife to live?	Very dissatisfied	dissatisfied	Neither Satisfied nor dissatisfied	Satisfied	Very satisfied
		1	2	3	4	5

xxii	To what extent are you satisfied with your faith in God?	1	2	3	4	5
xxiii	How satisfied are you with yourself?	1	2	3	4	5
xxiv	How satisfied are you with your abilities?	1	2	3	4	5
xxv	How important to you are the aspects of your life covered in question xxiv in this section?	Not at all	A little	Moderately	Very much	Extremely
		1	2	3	4	5

22	<b>SPIRIT DOMAIN</b>	Not at all	A little	Moderately	Very much/ mostly	Extremely/ completely
		1	2	3	4	5
	To what extent do you understand God?	1	2	3	4	5
	To what extent are you guided/motivated by God in your (daily) life?	1	2	3	4	5
	To what extent do you understand your religion/faith?	1	2	3	4	5
	To what extent do you think God is responsible for your present state?	1	2	3	4	5
	To what extent do you perceive your life to be meaningful?	1	2	3	4	5
		Very dissatisfied	dissatisfied	Neither Satisfied Nor dissatisfied	Satisfied	Very satisfied
		1	2	3	4	5
	To what extent are you satisfied with divine guidance in your life?	1	2	3	4	5
	How important to you are the aspects of your life covered in question 1.1) in this section?	Not at all	A little	Moderately	Very much	Extremely
		1	2	3	4	5

	<b>ECOSOCIAL DOMAIN</b>	Fully dependent	Requires substantial help	Requires minimal help	Requires no help but not back to work	Back to work
	Activities of daily living (feeding, bathing, walking, etc)	1	2	3	4	5
		Not at all	A little	Moderately	Very much	Extremely

		1	2	3	4	5
	How easy is it for you to communicate with people?	1	2	3	4	5
	How much support do you get from your relations?	1	2	3	4	5
	How much respect do you expect from others?	1	2	3	4	5
	How much respect do you get from others?	1	2	3	4	5
	How much support do you get from your friends?	1	2	3	4	5
	To what extent are you compelled by others to do what you do not consider suitable for you?	0	1	2	3	4
	How surplus is your financial resources?	1	2	3	4	5
	To what extent do you have access to optimal health services?	1	2	3	4	5
	To what extent do you have access to social support?	1	2	3	4	5
	How well are you able to manage your home and perform your domestic roles?	1	2	3	4	5
	To what extent are you performing your occupational duties?	1	2	3	4	5
	How healthy is your physical environment?	1	2	3	4	5
	To what extent do you have access to transport facilities?	1	2	3	4	5
	To what extent do you have opportunities to learn and acquire skills?	1	2	3	4	5
		Very dissatisfied	dissatisfied	Neither Satisfied Nor dissatisfied	Satisfied	Very satisfied
		1	2	3	4	5
	How satisfied are you with your personal relationships?	1	2	3	4	5
	How satisfied are you with the support you get from your friends?	1	2	3	4	5
	How satisfied are you with the condition of your living place?	1	2	3	4	5
	How satisfied are you with your access to health services?	1	2	3	4	5
	How satisfied are you with your treatment?	1	2	3	4	5
	How satisfied are you with your access to transportation?	1	2	3	4	5
	How important to you are the aspects of your life covered in questions 1-11 in this section?	Not at all	A little	Moderately	Very much	Extremely

12	SPIRITUAL INTERACTION DOMAIN	Not at all	A little	Moderately	Very much	An extreme amount/ completely
		1	2	3	4	5
	To what extent do you consider yourself close to God or your object of worship?	1	2	3	4	5
	To what extent do you meditate and/or study religious books?	1	2	3	4	5
	To what extent do you discuss aspects of your faith/religion with people of the same religious persuasion in order to strengthen your individual resolve?	1	2	3	4	5
		Very dissatisfied	Dissatisfied	Neither Satisfied Nor Dissatisfied	Satisfied	Very satisfied
		1	2	3	4	5
	How satisfied are you with your relationship with God or your object of worship?	1	2	3	4	5
	How satisfied are you with your effort to develop your faith/religion?	1	2	3	4	5
	How important to you are the aspects of your life covered in question 1-4 in this section?	Not at all	A little	Moderately	Very much	Extremely
		1	2	3	4	5

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# YORUBA VERSION OF THE HEALTH RELATED QUALITY OF LIFE IN STROKE PATIENTS

## AWON ILANA

Ayewo yii nbera bi o ti woye ipo ti ileto re wa lowolowo, didara sii igbesi aye re ati abala igbesi aye re miran. Jowo dahun gbogbo ibere yi pelu otito. Ti idahun re si ibere kan ko ba da o loju, yan eyi ti o sunmo idahun re julo. Jowo fi idinwon re, ireti re, igbaye gbadun re ati boti kan o gan si okan re Ronu nipa igbesi aye re ninu ose meji to koja. Yi odo si onka toba idahun re mu julo.

## ABALA ARA

iv	Ririn ati gbigbera	Ori ibusun	Ori keke ile iwosan	Pelu iranlowo clomii	Pelu ohun celo (fun apere opa iite) 4	Laisi iranlowo abi ohun celo 5
v	Kini gbedeke isoro ti e ni nipa gbigba nkan mu. yiyl owo ilekun. lilo sibi ati swan celo ijehun yoku, ki kowe, sisi agolo. gbigbe awon ohun to wuwo	0	1	2	3	4
vi	Bawo ni isoro ti eni nipa ito ati yiyagbe se po si	0	1	2	3	4
vii	Kini gbedeke isoro ti eni lati joko/dide duro lai fi subu	0	1	2	3	4
viii	Kini gbedeke isoro ti eni lati ri nkan to wani apakan oju tabi lati na owo mu nkan ni tori oju ti ko riran kedere	0	1	2	3	4
ix	Bawo ni irora, inira abi ara kiku se diyin lowo to lati se nkan tee fese	0	1	2	3	4
	Bawo ni es enilo itoju egbo igj tabi lilo si ile	0	1	2	3	4

x	iwosan to luti le ja fafa ninu igbesi aye yin					
xi	Ba wo ni aisan yi se pa ibalopoo lokolaya yin lara si?	1 Ko temilorun rara	2 Ko temilorun	3 Mi o tile laso	4 O temilorun	5 O temilorun ganni
xii	Bawo ni oti te yin lorun si bi e ti nse ojuse yin lojoojumo fun apeere, jijeun, wiwe, yiyagbe, winoso, yiyarun ati beebelo	1	2	3	4	5
xiii	Bawo ni ise oojo yin se te yin lorun si to	1	2	3	4	5
xiv	Bawo ni igbesu aye ibalopoo lokolaya yin se te yin lorun to?	1	2	3	4	5
xv	Bawo ni awon ibeere ni abala yi sese pataki si lori igbe aye yin	Rara ati rara 1	Die 2	Niwonba 3	Lopolopo 4	Pupo ganni 5
<b>ADALA IRONU</b>						
i	Eemelo ni eni ironu bi ibinu. aniyani, irewesi okanni ibere ati beebelo	0	1	2	3	4
ii	Nje eni agbara toto fun igbesi aye ojoojumo yin	1	2	3	4	5
iii	Bawo ni irisi yin se te yin lorun si	1	2	3	4	5
iv	Bawo laso n gbadun ise yin is	1	2	3	4	5
v	Eemelo ni e ma nre rin	1	2	3	4	5
vi	Bawo laso n gbadun igba	1	2	3	4	5

	Isinmi ati ere sise yin si					
vii	Bawo ni okan yin se bale si pe ko si ewu abi ijaya fun yin	1	2	3	4	5
viii	Nje eti le ro pe iku dara ju ipo ti ilera yin wa lowolowo	1	2	3	4	5
ix	Nje o ti wa si okan yin lati lo pin si aye yin ri?	1	2	3	4	5
x	Nje orun yin te yin lorun ati iye akoko ti e fin nsun	1	2	3	4	5
xi	Bawo ni ironu yin se te yin lorun si?	1	2	3	4	5
xii	Bawo ni gbogbo ibere abala yii ti se pataki si yin lo	Rnra ati nra 1	Die 2	Niwonba 3	Lopolopo 4	Pupo ganni 5
<b>ABALA IMO OPOLO</b>						
i	Bawo ni e ti le fokan si nkan lo	1	2	3	4	5
ii	Bawo ni e se ngbagbe nkan si	0	1	2	3	4
iii	Kini odiwon bi e ti le lete yara ko nkan titun si	1	2	3	4	5
iv	Bawo ni oye aisan yin ti ye yin si	1	2	3	4	5
v	Bawo ni e se le ronu si lati wa Idahun si ati lati gbe igbese totoo lori awon isoro ti e ndojuko	1	2	3	4	5
vi	Bawo ni ose ro yin lorun si lau fi okan yin bale	1	2	3	4	5
vii	Bawo ni irohin to wulo fun igbe aye yin o joojumo se	1	2	3	4	5

	wa la rowoto yin si					
vii	Nje oro siso yin ja geerege	1	2	3	4	5
		Ko temilorun rara	Ko temilorun	Mi o tile mo	O temilorun	O temilorun ganni
ix	Nje bi e tile fi nkan soka ati fi okan ba nkan lo te yin lorun	1	2	3	4	5
x	Bawo ni oro siso yin ti te yin lorun si	1	2	3	4	5
xi	Nje eni itelorun lori bi e ti ronu ati kiko nkan	1	2	3	4	5
xii	Bawo ni gbogbo ibeere abala yi sese pataki si yin to	Rara ati rara	Die	Niwonba	Lopolopo	Pupo ganni 5
	<b>ABALA TI OKAN</b>					
i	Bawo le ti ni iye lori to loju ara yin	1	2	3	4	5
ii	Bawo ni e ti ni igbekele ninu ara yin to	1	2	3	4	5
iii	Bawo ni ese ni igbekele ninu Olorun yin si	1	2	3	4	5
iv	Bawo ni ese le seda nkan tuntun si	1	2	3	4	5
v	Nje e tile te da ronu ati gbe igbese fun ra yin	1	2	3	4	5
vi	Nje e gbagbo pe wiwa laye yin fun idi kan ni	1	2	3	4	5
vii	Nje o wun yin lati mu ipin yin se	1	2	3	4	5
viii	Nje e gbagbo ninu ayanmo	1	2	3	4	5
ix	Nje e gbagbo ninu igbe aye gbunduku	1	2	3	4	5
	Nje e ro pe ipo ti cwa yii	0	1	2	3	4

x	lee di yin lowo lati mu ipin yin se					
xi	Nje e ro ninu ara yin pe ipo yin lowolowo yi yoo ras yin lowo lati mu ipin yin se	1	2	3	4	5
xii	Nje iran /iwoye yin lihan pe ipo ti ilera yin wa buru	0	1	2	3	4
xiii	Bawo ni ese n ni imisi si	1	2	3	4	5
xiv	Nje e ni igbekele ninu Olorun lati yanju isoro ti e nkoju	1	2	3	4	5
xv	Nje eni igbekele ninu ara yin lati yanju isoro yin	1	2	3	4	5
xvi	Nje e gbagbo pe esu lowo si nkan ti o nse yin lowolowo	1	2	3	4	5
xvii	Nje e gbagbo pe e yin tabi elomii lowo si nkan I to nse yin ju Olorun lo	1	2	3	4	5
xviii	Nje e gbagbo pe aye kan wa lehin eyii	1	2	3	4	5
xix	Bawo ni igbagbo yin ninu Olorun se to	1	2	3	4	5
xx	Bawo ni e ti nse esin yin si	1	2	3	4	5
xxi	Se e gba ipo ti ewa lowolowa yii	1	2	3	4	5
xxii	Bawo ni o se wun yin lo lati wa laaye	1	2	3	4	5
		Ko temiforun rara	Ko lemi lorun	Mi o leeso	O Temilorun	O Temilorun gan
xxiii	Nje igbagbo yin ninu Olorun te yin lorun	1	2	3	4	5

xxv	Se e ni itelorun pelu ara yin	1	2	3	4	5
xxv	Nje e ni itelorun pelu awon akan ti e le dase	1	2	3	4	5
xxvi	Nje gbogbo ibeere ti amenu ba ninu abala yi se pataki si yin	Rara ati rara 1	Dic 2	Niwonba 3	Lopolopo 4	Pupo ganni 5
<b>ABALA EMI</b>						
i	Bawo ni oye Olorun ti ye yin to	1	2	3	4	5
ii	Kini gbedeke itosona ti e ni gba lodo Olorun fun igbe aye ojoojumo yin	1	2	3	4	5
iii	Bawo ni oye esin yin ti ye yin si	1	2	3	4	5
iv	Nje e tero wipe amuwa Olorun ni ipo ti e wa yii	1	2	3	4	5
v	Nje oro aye yin ti le ni itumo si yin	1	2	3	4	5
vi	Bawo ni itoni atorunwa fun igbe aye yin se te yin lorun si	Ko temi lorun rara 1	Ko temi lorun 2	Mi o leeso 3	O temi lorun 4	O temi lorun ganni 5
v	Bawo ni gbogbo ibeere ti amenu ba ni obala yi se se pataki sii	Rara ati rara 1	Dic 2	Niwonba 3	Lopolopo 4	Pupo ganni 5
<b>ABALA IBARA ENI</b>						
<b>GBEPO</b>						
i	Awon ohun ailemasa bi. ounjẹ, wiwe, yiyogbe ati beebẹ lo	Aite da nkankari se 1	Nilo iranlowo pupo 2	Nilo iranlowo dile 3	Lile da ohun se sugbon ko ti pada senu ise 4	Mo ti pada senu ise 5
ii	Bawo ni o li lorun fun yin	Rara ati 1	Dic 2	Niwonba 3	Lopolopo 4	Pupo ganni 5

	lati ba awon eniyan soro si	rara				5
		1	2	3	4	
iii	Kini gbedeke iranlowo ti e nri gba lodo awon ebi yin	1	2	3	4	5
iv	Kini gbedeke ibowofun ti e nreti lodo awon eniyan	1	2	3	4	5
v	Kini gbedeke ibowo fun ti e nri gba lodo awon eniyan	1	2	3	4	5
vi	Kini gbedeke iranlowo ti e nri gba lodo awon ore yin	1	2	3	4	5
vii	Bawo ni awon eniyan se nri ipa mu yin to lati se ohun ti ko te yin lorun	1	2	3	4	5
viii	Bawo ni e ti ngbo bukata ara yin si	1	2	3	4	5
ix	Bawo ni e se ni anito ati aniseku si	1	2	3	4	5
x	Bawo ni itoju to peye se wa larowo to yin si	1	2	3	4	5
xi	Bawo ni e se nri iranlowo si lati odo awon ti o yi yin la	1	2	3	4	5
xii	Bawo ni e lise le se akoso ile ati ise inu ile yin si	1	2	3	4	5
xiii	Bawo ni e ti se n se ise oojo yin si	1	2	3	4	5
xiv	Ipo wo ni ayika yin wa nipa ti ilera	1	2	3	4	5
xv	Bawo lo se torun sun yin lati lo si ibi to ba wan yin	1	2	3	4	5
xvi	Kini gbedeke anfan ti e ni lati ko ati mo ohun titun	1	2	3	4	5
xvii	Bawo ni ibasepo yin ti te yin lorun si	Ko temilorun	Ko temilorun	Mi o tile leso	O temilorun	O temilorun

		rara				ganni
		1	2	3	4	5
xviii	Bawo ni o ti te yin lorun si inu iranlowo ti e nri gba lati odo awon ore yin gbogbo	1	2	3	4	5
xix	Nje ipo ayika ibugbe yin te yin lorun bii	1	2	3	4	5
xx	Nje ironun ti e ni lati gba itoju ilera to pe ye te yin lorun	1	2	3	4	5
xxi	Nje itoju ti e nri gba te yin lorun bii	1	2	3	4	5
xxii	Bawo ni anfonu ti eni si kalo kabo se te yin lorun si	1	2	3	4	5
xxiii	Bawo ni gbogbo ibcere ti amenu ba ni abala yi sese Palaki si yin to	Rara ati rara 1	Die 2	Niwonba 3	Lopolopo 4	Pupo ganni 5
	<b>ABALA AJOSEPO TI EMI</b>					
	Bawo ni e ti ro pe e sun mo olorun tabi ohun ti e nsin to	1	2	3	4	5
ū	Bawo ni e ti nse asoro ninu iwe mimo yin si	1	2	3	4	5
ai	Bawo ni e ti se nso ajosopo lori ohun ti e gbogbo pelu awon elesin kanna bi ti yin si	1	2	3	4	5
ri	Nje ibasopo laarin yin ati Olorun tabi ohun ti e nsin te yin lorun bi	Ko temi lorun rara 1	Ko temilorun 2	Mi o tile leeso 3	O temi lorun 4	O temi lorun ganni 5



v	Nje o te yin lorun bi e ti n sapa lati dagba ninu esin yinbi	1	2	3	4	5
vi	Bawo ni gbogbo ibeere ti a nienu ba ninu abala yi tite yin lorun si	Rara ati ruru 1	Die 2	Niwonba 3	Puporupo 4	Pupoganni 5

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APPENDIX F - ETHICAL APPROVAL



INSTITUTE FOR ADVANCED MEDICAL RESEARCH AND TRAINING (IMRAT)  
COLLEGE OF MEDICINE, UNIVERSITY OF IBADAN, IBADAN, NIGERIA.  
Tel: 234-2-2412170, 234-2-7410000 Fax: 234-2-7412943



UUCHEC Registration Number: NI/REC/05/01/2009

NOTICE OF FULL APPROVAL AFTER FULL COMMITTEE REVIEW

Re: Development and Evaluation of a Primary Health Care-Based Physiotherapy Protocol for Stroke Rehabilitation

UUCHEC Ethics Committee assigned number: UUCHEC/05/0053

Name of Principal Investigator: Mrs Olubukola A. Olatoye

Address of Principal Investigator: Department of Physiotherapy,  
College of Medicine, University of Ibadan

Date of receipt of valid application: 06/01/2009

Date of meeting when final determination of research was made: N/A

This is to inform you that the research described in the submitted protocol, the consent form, and other participant information materials have been reviewed and given full approval by the UUCHEC Ethics Committee

This approval dates from 01/07/2009 to 02/07/2010. If there is delay in starting the research, please inform the UUCHEC Ethics Committee so that the dates of approval can be adjusted accordingly. Note that no part of or activity related to this research may be conducted outside of these dates. All adjustment requests must be used in the study, and you must the UUCHEC registration number and date of UUCHEC approval of the study. In multi-year research, endeavour to submit your annual reports to the UUCHEC early in order to obtain renewal of your approval and avoid suspension of your research.

The National Code for Health Research Ethics requires you to comply with all Institutional Guidelines, rules and regulations and with the terms of the Code including ensuring that all adverse events are reported promptly to the UUCHEC. Any changes are permitted in the research without prior approval by the UUCHEC except in circumstances outlined in the Code. The UUCHEC reserves the right in certain circumstances to suspend or terminate research without prior notification.


Dr. A. A. Adenipekun,  
Chairman, Medical Advisory Committee,  
University College Hospital, Ibadan, Nigeria  
Vice-Chairman, UUCHEC Ethics Committee  
E-mail: [aaadenipekun@yahoo.com](mailto:aaadenipekun@yahoo.com)

Research Units: •Genetics & Bioethics •Malaria •Environmental Sciences •Epidemiology Research & Services •HIV/AIDS  
•Behavioural & Social Sciences •Pharmaceutical Sciences •Cancer Research & Services

APPENDIX G - PERMISSION FROM PHC AUTHORITY



**IBADAN NORTH-WEST LOCAL GOVERNMENT**

**PRIMARY HEALTH CARE DEPARTMENT**

OFFICE:  
Dugbe/Onireke,  
P.M.B. 5851, Ibadan  
Tel: 2411214  
10062010 11891

Our Ref.....

Your Ref.....

Date ..... 20.....

Sir Olajide Olubukola Adesida  
Post-graduate Student  
Department of Physiotherapy  
University of Ibadan  
Ibadan

Dear Sir,

**RE:- REQUEST FOR PERMISSION TO CONDUCT A RESEARCH STUDY WITH  
THE TITLE:- DEVELOPMENT AND EVALUATION OF A PRIMARY HEALTH  
CARE BASED PHYSIOTHERAPY PROTOCOL FOR STROKE REHABILITATION**

Sequel to your request letter to us seeking for permission to conduct a research study on the "Development and evaluation of a primary health care based physiotherapy protocol for stroke rehabilitation" using our health facilities and the communities within the Local Government. The benefit to the clients and the communities have also been appraised and found to be of healthful benefit to the people.

In the light of the above, we wish to grant you the entry into the communities under our auspices as well as providing a separate consulting room for your convenience at Oniyarin Comprehensive health centre.

It is to add that you are to communicate your findings to us in good time for the purpose of improving the general health status of the Local Government.

Yours faithfully,  
*Famakin M.*  
Dr. Famakin M.  
PMOH/PHC Coordinator  
Ibadan North West Local Govt.  
Onireke / Dugbe.

for The Chairman  
Ibadan North West Local Govt.  
Onireke / Dugbe

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## APPENDIX II

### THE PRIMARY HEALTH CARE-BASED PHYSIOTHERAPY PROTOCOL (PHCPP)

The PHCPP comprised of structured exercises to improve strength in the affected extremities, train or restore balance and bi-manual activities. They are:

(a) **Strength Training:** Assistive and resistive exercises using Proprioceptive Neuromuscular Facilitation (PNF) patterns to the muscle groups of the upper and lower limbs. This was used to facilitate movement in muscle with inadequate strength for active exercises. The PNF exercises include upper and lower extremities patterns. The movement patterns are in diagonals. Assistance and resistance were manually given and is subjective, based on what each participant can tolerate. PNF patterns were used until there was adequate strength in the extremities for active movement. Progression was by the use of mechanical resistance (free weights) to strengthen the muscles. Resistance was increased when patient could complete two sets of 10 repetitions of each movement through the available range of motion.

(b) **Balance training** was carried out using the Berg Balance Scale domains (Au-Yeung et al. 2003; Hamzat and Fashoyin, 2007). Participants carried out the following tasks:

- i) **Standing unsupported:** The patient stood from sitting without holding on to anything and remained standing unsupported for 2 minutes. Progression was by increasing the activity by one repetition and the duration of standing by 10 seconds weekly.
- ii) **Sitting unsupported with feet on the floor** which entailed the patient sitting with back unsupported and arms folded for 2 minutes. This was progressed by a 10 seconds increase weekly.
- iii) **Transfer activities:** Moving from chair to bed and back again – with and without armrests. This was increased by one repetition weekly.
- iv) **Standing unsupported with eyes closed** for 10 seconds which was increased by two seconds weekly.

v) Standing unsupported with feet together. Patient placed feet together and stood without holding on to anything for 10 seconds. The duration was increased by 10 seconds weekly.

vi) Reaching forward with outstretched arms while standing. Patient lifted arms to  $90^\circ$ , stretched fingers out and reached forward as far as possible. This was increased by one repetition weekly.

vii) Retrieving object from floor: involved picking up shoe / slipper in front of feet with standing as the starting position. It was increased by one repetition weekly.

viii) Turning to look behind over left and right shoulders while standing which was increased by one repetition weekly.

ix) Turning  $360^\circ$  completely around in a full circle, pause and then turn a full circle in the other direction within 4 seconds. Progression was by increasing the activity by one repetition weekly.

x) Stool stepping by placing each foot alternately on the stool until each foot has stepped the stool four times. This was increased by one repetition weekly.

xi) Tandem stance: involved standing unsupported with one foot in front of the other. Where this was not possible, the foot in front was moved ahead of the one at the back as much as possible with the heel of the forward foot directly in front of the toes of the backward foot for 30 seconds. It was increased by 5 seconds weekly.

xii) Standing on affected leg without holding on to anything for 15 seconds which was increased by 3 seconds weekly.

(c) Bi-manual activities of the affected upper limb were trained using a combination of self-assisted exercises and task-oriented functional activities. The self-assisted exercises consisted of exercises the patient can carry out by himself or herself using the unaffected extremities. The task-oriented activities consisted of a battery of tasks that are needed for normal activities of daily living such as opening doors, buttoning and un-buttoning clothes, screwing and unscrewing bolts and nuts (Plate 3). Progression was by withdrawing assistance given, increasing the complexity of task and the speed of carrying out the task.